AVIATION WEEK
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OCT. 12, 1953
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Official U. S. Navy photograph of the pilotless Regulus, landing after test flight

IN developing the pilotless Regulus, the Navy's new guided missile, Chance Vought called upon the Aviation Products Division of Goodyear for help in solving two tough problems.

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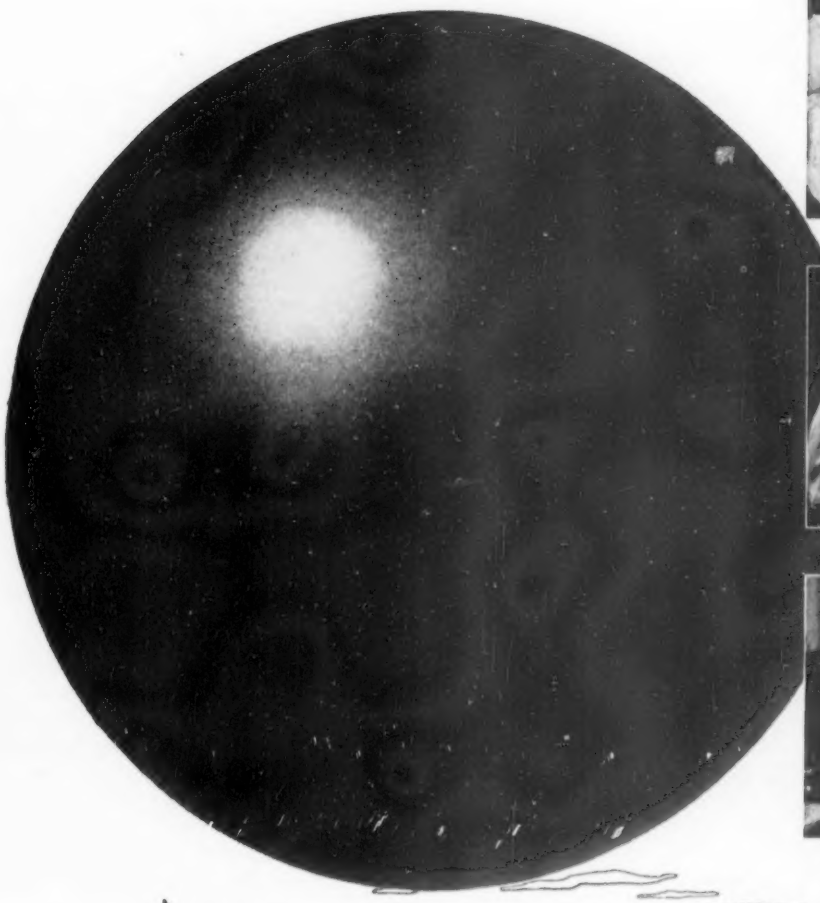

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Aviation Week

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Table of Contents on Page 8

48,504 copies of this issue printed

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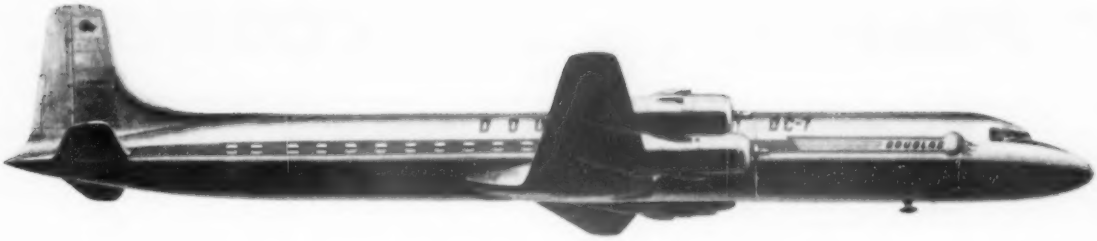

76 AiRESEARCH UNITS

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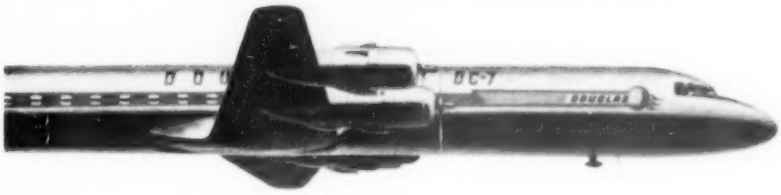
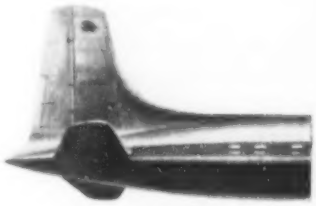


NEW DOUGLAS DC-7



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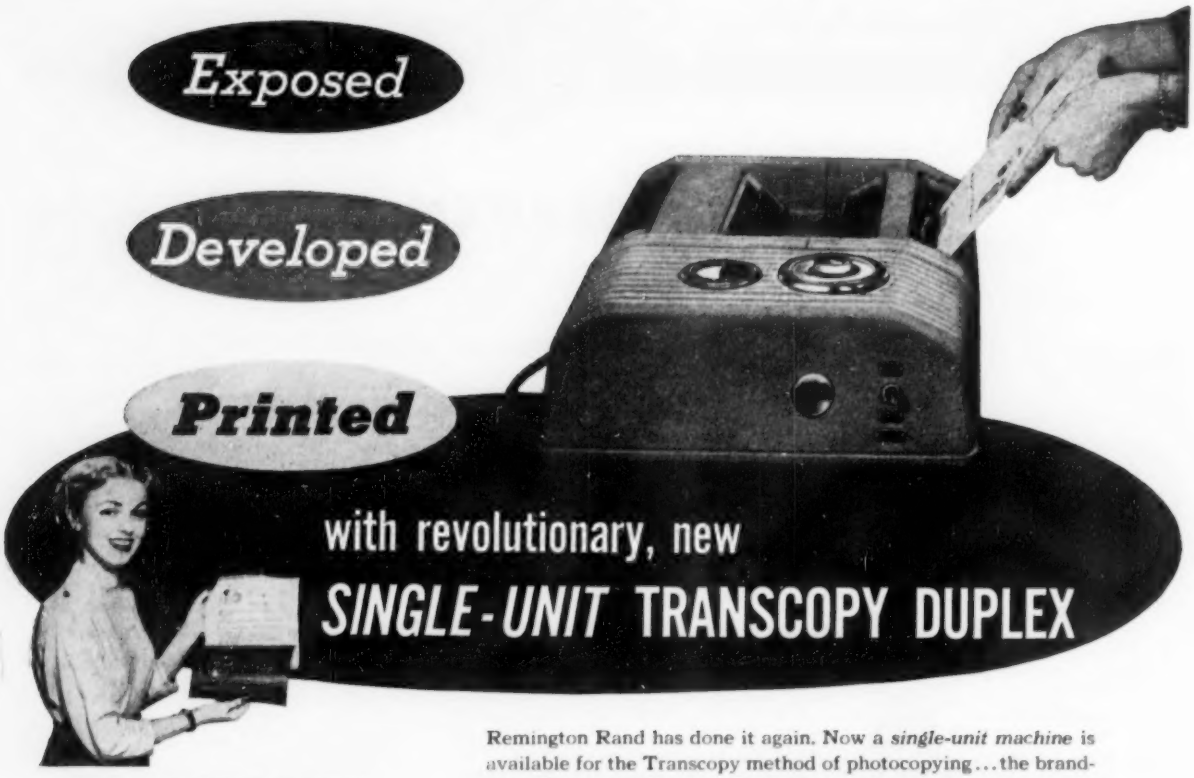

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NEWS DIGEST

Domestic

Announcement was expected momentarily last week of a program to convert existing CAA distance measure equipment (DME) stations to newly developed military system. New system will enable both commercial and military planes to operate from the same ground stations. Plan worked out by Defense Department and CAA will save cost of erecting and operating a military DME network but will slow airline adoption of DME by requiring redesign of the present civil system.

Aircoach Transport Assn., in behalf of its 40 nonsked airline members, offered to fly first-class mail for 15¼ cents per ton-mile. Four scheduled airlines last week began an experimental all first-class mail by air service (see p. 20).

New air-ground communications have been tested successfully by Pan American World Airways on eight trans-Pacific flights. PAA's selective calling system (Selcall) eliminates constant radio monitoring by flight crews, contacts transports by transmitter pulses that set off a bell and light in cockpit.

British team of 13 leading jet and rocket engine designers arrived in New York last week en route to Washington, D. C., conference with U. S. military authorities and to meetings in Montreal with Canadian government and aircraft industry officials.

Piper Pacer seaplane has been approved for large Edo Model 2000 floats, increasing allowable gross weight 1,830 lb. and giving greater stability in water taxiing and better takeoff characteristics.

Lightplane shipments by five manufacturers totaled 318 aircraft valued at more than $2.9 million during August, dropping from the previous month's 369 units at $3,287,000, Aircraft Industries Assn. reports. The companies: Aero Design, Beech, Cessna, Piper and Taylorcraft.

Strategic Air Command will hold its annual bombing and navigation competition at Walker AFB, Roswell, N. M., Oct. 25-31, flying B-47s, B-36s, B-29s and B-50s.

Newark (N. J.) Airport has reopened its East-West runway after completion of an $88,000 improvement project that strengthened the 6,800-ft. strip to handle aircraft weighing up to 150,000 lb. The runway will be designated 11-29.

Ryan Side-by-Side Trainer

First flight photo of Ryan Aeronautical Co. side-by-side Model 72 military trainer version of the Navion (see p. 24 for details). Ryan has entered the plane in a Navy competition. Bubble-type canopy would be standard in production model, company says.

National Association of Flying Farmers will hold its 1954 convention at Fresno, Calif., next June. California Aeronautics Commission predicts more than 1,500 delegates will attend the meeting, flying an estimated 500 planes.

Peripheral VHF communications setup which enables New York air route traffic controllers to talk directly with airline pilots up to 175 mi. away (AVIATION WEEK Jan. 26, p. 38), is given major credit for ARTC center's ability to eliminate traffic-flow restrictions and handle 30% more traffic with only 8% more personnel. Civil Aeronautics Administration reportedly is considering similar installations at more ARTC centers.

Aviation pioneers from throughout the world will be honored at a banquet sponsored by the National Aeronautic Assn. Oct. 14 as part of this year's celebration of the 50th anniversary of flight. Toastmaster at the dinner, to be held at the Mayflower Hotel, Washington, D. C., will be Lt. Gen. James H. Doolittle.

Financial

Allegheny Airlines reports a net profit of $42,190 for the fiscal year ended June 30, compared with a net loss of $142,537 for fiscal 1952. Operating revenues increased $167,624 to $3,886,-566, while mail payments were cut $8,585.

Continental Motors Corp., Detroit, and its subsidiaries made net earnings of $4,697,107 during the nine months ended July 31.

Northwest Orient Airlines has declared a regular quarterly dividend of 28¾ cents per share on 4.6% cumulative preference stock, payable Nov. 1 to stockholders of record Oct. 20.

International

Experimental turbine production has been set up in the reorganized **Japan Jet Engine Co.** The firm is working on a 2,000-lb.-thrust powerplant, will produce five engines of 6,000 lb. thrust each in 1954-55.

Fokker Aircraft Co., Amsterdam, reports a net profit of approximately $44,-360 for 1952, compared with $470 in 1951.

Silver City Airways, Britain's cross-channel air ferry, made a net profit of $92,263 last year, a decrease of $43,375 from 1951.

Orient Airways will merge with government-operated Pakistan International Airlines by April of next year, authorities at Karachi report. The combined carrier will begin operations with three new Super Constellations plus Orient's current fleet of two Convairs and 11 DC-3s.

Copenhagen's Kastrup Airport has started a $2.9-million expansion, will be able to dispatch aircraft at a rate of two planes per minute when the six-year project is completed.

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The Aviation Week

October 12, 1953

Headline News

Wilson Puts Squeeze on Industry..... 14
1955 Air Budget Stirs New Fight..... 15
F4D Sets Speed Record..... 16
Aircraft Inventories Total $2.4 Million. 17
Global Airlines..... 17
Wilson Debunks H-Bomb Threat..... 18
Hydro-Ski Liner..... 18
Engineers Plot Economy Course..... 19
First Bulk Airmail Flights..... 20
CAB Freezes 75% Coach Fare Ceiling.. 20
Pilot Visibility..... 22
Ryan Enters Navion in Navy Test..... 24
RCAF $400-Million Base Program..... 28

•

Production

McDonnell Phases In F3H, F-101..... 30
Plastic Cuts Die Forming Time..... 32
Military S-55s Roll Down Line..... 40

•

Aviation Safety

CAB Report on Cessna, DC-3 Crash.... 43

•

Avionics

Powder to Product—Automatically..... 72

•

Equipment

Comets Use High-Energy Ignition..... 83

•

Financial

Options: For the Few or Many?..... 93

•

Air Transport

A Long Look Ahead.....107
PAL Boosts DC-3 Seating, Cuts Fares..108
Bolivia, Ecuador Bid for Air Traffic....108
Lower Airline Profits for 1954.....108
Air News Service Plans Expansion... 111
Atlas Diverted NEA Profits: CAB.....111
New Jap Airlines Plan Local Service...112
Fixed Rates Urged for Military Airlift..112
BEA Plans Revival of 1st Class Flights.113

•

Editorials

Putting a Squeeze on Industry.....118
Strange Case of the Errant MiG.....118

•

Departments

News Digest..... 7
Picture Page..... 9
Industry Observer..... 10
Who's Where..... 10
Washington Roundup..... 13
Letters..... 52
What's New..... 66
Filter Center..... 80
New Aviation Products..... 87
Also on the Market..... 92
CAB Orders.....111
Shortlines.....116
Aviation Calendar.....116

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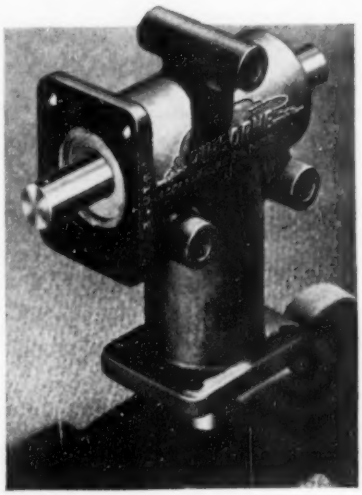

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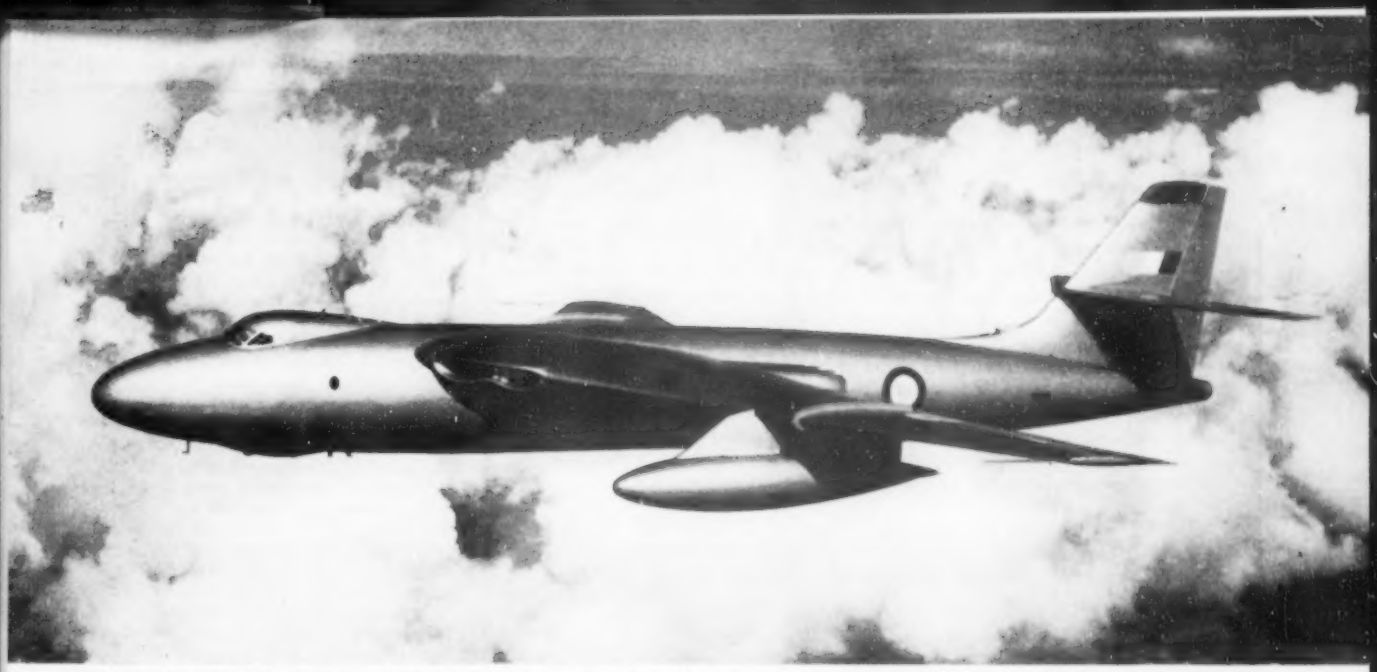

LONG-RANGE VICKERS VALIANT—Britain's four-jet bomber flies with external fuel tanks, installed on this Mark 1 version for the London-Christchurch, New Zealand, air race before Valiant was withdrawn by the British Air Ministry from last week's 12,000-mi. contest.

Foreign Aviation News in Pictures

TWIN-TAIL M.D. 316—Dassault light transport is an enlarged M.D. 312, has Snecma 14X radials replacing in-line Renault engines.

ATAR-POWERED OURAGAN—Axial-flow 10ID Atar jet replaces centrifugal-flow Nene 102 in experimental Dassault M.D. 450.

ADVANCED TRAINER—This is the latest version of France's Morane-Saulnier M.S. 479 two-place advanced military trainer.

LONG-NOSE LIAISON—N.C. 856A liaison craft (Snecma engine) was designed by Sncac, is being made by Sncan for French air force.

INDUSTRY OBSERVER

► British sources say there is not much difference in fuel economy between the Rolls-Royce Conway bypass engine and the Bristol Olympus pure jet. Conway is reported to burn 0.71 lb. of fuel/lb. thrust/hr. against 0.75 for Olympus. Thrust of the Conway is around 13,000 lb.; if the same mass airflow were used in a purejet instead of a bypass, the thrust would approach 19,000 lb.

► **Bristol temporarily has shelved plans to build a Britannia 200 airfreighter. On the basis of a survey of future trans-Atlantic cargo market, British Overseas Airways Corp. reduced its option for these freighters from six to two. BOAC probably would reverse this decision if it could prevent British non-scheduled airlines from participating in trans-Atlantic cargo traffic, but the British independents appear to have a clear shot at this market.**

► Navy has washed out the remainder of the Grumman F10F Jaguar contract calling for construction of 11 service test models. Original experimental XF10F which flew at Edwards AFB has been dismantled and shipped to the Naval Air Materiel Center at Johnsville, Pa., where it will be used as an engine test bed.

► **United Air Lines is considering installing its commercial adaptation of military airborne radar in its new DC-7s. The UAL radar is currently being flight tested experimentally and is aimed primarily at weather avoidance and warning of mid-air collisions (Aviation Week Sept. 28, p. 84). Estimated cost of the airborne radar installation in a DC-7 is $30,000.**

► General Electric has a military research contract to develop instrumentation for non-destructive inspection of skin-to-skin and skin-to-honeycomb metal adhesive bonds. Glenn L. Martin Co. is investigating details of adhesive bonded skins of large total laminated thickness.

► **Industry circles predict Trans World Airlines may make an attempt to compete with American Airlines' bid to offer the first regularly scheduled nonstop transcontinental airlines service—at least on eastbound schedules. AA has announced inauguration of this service Nov. 29 with Douglas DC-7s now undergoing final CAA certification flight tests. If TWA makes the move, it could use Lockheed 1049 Super Constellations already in service for the nonstop jump.**

► KLM Royal Dutch Airlines, first airline to put the Wright Turbo Compound piston engine into commercial service, generally is pleased with the new powerplant. KLM officials told AVIATION WEEK biggest problem to date has been cracking of turbine nozzle boxes, followed by cracking of turbine cooling caps. KLM has some Turbo Compounds that already have logged 350-450 hr. in regular service.

► **Aircraft Industries Assn. reports wide disagreement among its members on what the newly organized guided missiles committee should actually do to develop a useful industry-wide approach to the problem of improving guided missile reliability.**

► CAA administrator Fred B. Lee has been asked by the Aircraft Industries Assn. to study the possibility of allowing manufacturers to certificate their own light helicopters not intended for air carrier operations. CAA already has offered this option on CAR 3-type aircraft below 6,000 lb. gross weight. Meanwhile, the Air Transport Assn. and AIA's aircraft requirements committee are working with Civil Aeronautics Board to develop transport category requirements for air carrier-type helicopters.

► **British Ministry of Supply has ordered Fairey Aviation Ltd. to build a prototype Rotodyne jet helicopter powered by two 3,000-eshp. Napier Eland turboprops.**

► Bristol's Model 181 helicopter design calls for a twin-engine, tandem-rotor configuration with seating capacity for more than 60 passengers.

WHO'S WHERE

In the Front Office

Guy W. Vaughan, former chairman of Curtiss-Wright Corp. and Wright Aeronautical Corp., has been elected a director of John Chatillon & Sons, New York.

Bonner W. A. Dickson, onetime director and general manager of Vickers-Armstrong's aircraft section, has joined the board of Flight Refuelling, Blandford, England. **Wing Cmdr. H. C. Johnson** has rejoined the company as special representative for exploration and development of new fields.

Walter C. Thompson is new executive vice president of Torrington Co., Torrington, Conn.; **Ray B. Nichols** has become vice president-sales. Promotions in the aircraft equipment firm's South Bend subsidiary, Torrington Co. of Indiana: **Rodney T. Dunlap,** vice president-general manager; **John A. Toth,** assistant general manager, and **Walter Fisher,** chief engineer.

William Paul Youngs has been appointed vice president-sales of Aircraft Supplies, Nutley, N. J.

Changes

K. G. Farrar has been promoted to general manager of Douglas Aircraft Co.'s Long Beach (Calif.) Division.

Air Vice Marshal Frank Long (RAF Ret.) has joined de Havilland Propellers, Ltd., Hatfield, England, as senior liaison officer.

Loral D. Bonham is new chief engineer of Fletcher Aviation Corp., Pasadena, Calif.

Carl F. Schunemann has been named chief engineer of Thompson Products' Electronics Division, Cleveland. **Jerome L. White** is new senior project engineer at the Columbus, Ohio, antenna research laboratory.

D. H. Silvern has been named senior engineer in charge of the gas turbine analysis group at Continental Aviation & Engineering Corp., Detroit.

Tom S. McCrae, former general manager of Avro Canada's Gas Turbine Division, has rejoined the Allison Division of General Motors Corp., Indianapolis, as assistant director of engineering.

J. H. Overholser has become assistant to the general manager of Bendix Aviation's Pacific Division, North Hollywood, Calif.

B. P. Gibbons is new manager of material at Convair's San Diego Division; **Paul G. Osborn** has been promoted to factory manager of Plant 1.

Gid A. Kelley has been appointed manager of Northrop Aircraft's cost estimating department, Hawthorne, Calif.

Honors and Elections

Thomas E. Braniff, president of Braniff International Airways, has been appointed general chairman of Brotherhood Week, to be observed Feb. 21-28 under sponsorship of the National Conference of Christians and Jews.

Delos W. Rentzel, president of Auto-Transports, Oklahoma City, has been elected a member of the National Business Aircraft Assn., Washington, D. C.

CUTLASS ABOARD A CARRIER AT SEA

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Washington Roundup

Spanish Bases

The Spanish air bases, finally secured by the U. S. after three years of diplomatic jockeying, are no longer as important as they were when negotiations for them were begun in 1950. Reason: Russia now has a fleet of jet bombers capable of attacking the Spanish air bases from airfields in East Germany. It is doubtful if any significant amount of U. S. air power will use the Spanish bases in the face of this threat. Strategic Air Command will continue to count on its North African bases, which still are out of range of the Russian Il-28 jet bombers.

Refueling Problem

Gen. Curtis E. LeMay, commander of the Strategic Air Command, told a recent USAF commanders' conference in Washington that he is extremely unhappy over SAC's current dependence on aerial refueling to accomplish its long-range mission with jet bombers. LeMay is strongly interested in development of an intercontinental jet bomber that can do the job of atomic bomb delivery without aerial refueling.

General Cook's Role

Top-level Pentagon briefing of USAF staff on the new role of Gen. Orval Cook as overall materiel czar, with authority over Air Materiel Command and Air Research and Development Command, indicates his position will be even more dominant than suggested by original announcement by USAF Secretary Harold Talbott (AVIATION WEEK Oct. 5, p. 13). Gen. Cook will have veto power on all USAF research and development programs, although their routine administration will be handled by Lt. Gen. Laurence Craigie who is now subordinate to Gen. Cook.

Farley's Return

James Farley, who as Postmaster General fought a long but losing battle against setting up a system of certificates of convenience and necessity for air operations in the mid-30s, is back in Washington as a member of the Hoover Commission—which will have much to say about the future regulation of air transportation. Farley's main argument at the time: Post Office should have authority to determine mail routes and schedules.

Shrink Washington?

Two commissions that will lay down the overall policies into which the specific recommendations of the Administration's survey on aviation under Undersecretary of Commerce Robert Murray will be fitted are now tackling their task:

Commission on Intergovernmental Relations, concerned with getting the federal government out of fields that might be taken over by states and cities. The law which created the 25-member commission, headed by Clarence Manion, former dean of Notre Dame Law School, pointed to its necessity because "the federal government has been extended into many fields which, under our constitutional system, may be the primary interest and obligation of the several states and their subdivisions."

The commission's report, which will govern Administration policy on such issues as federal airways operations and federal airport aid, is due Mar. 1.

Commission on Governmental Operation, directed to consolidate and abolish federal activities "not necessary to the efficient conduct of government." Recommendations of the commission, headed by former President Herbert Hoover, probably will be forthcoming shortly after the reconvening of Congress in January. Final report isn't due until December 1954.

Impromptu remarks by Hoover point to abolition of Civil Aeronautics Board. His observation: "There are 75 or 80 independent agencies. If the President gave one hour a week to each of them, that would mean he was spending 75 or 80 hours a week just on special agencies without doing anything else. No one looks after them but the budget director. . . ." The way "to get them out of the President's hair," Hoover suggested: consolidate them into the government departments.

Remarks of Michigan's Sen. Homer Ferguson, a member of the commission and author of the law setting it up, hint at a major housecleaning of top staff members of CAB and CAA. He proposed that all posts paying more than $4,200 a year actually were "policy making" and should be taken out of Civil Service jurisdiction and turned over to Administration supporters.

MATS Reorganization

Reorganization of Military Air Transport Service as a separate entity operating on a revolving fund, after the pattern of Military Sea Transport Service, is being pushed.

"When management has to account and the customer has to pay, it injects the incentive motive for economy and efficiency," USAF's Assistant Secretary H. Lee White comments. This reflects a sharp change in USAF policy, which long has resisted efforts along this line on the ground that MATS is a training operation.

With an initial capitalization from Air Force funds, MATS would be self-sustaining, charging "customers"—Army, Navy, USAF—for services. Col. H. J. Nevins, under the Deputy Chief of Staff for Operations, is the project officer drawing up plans for the change in MATS.

AAR vs. Airmail

Association of American Railroads is hitting indirectly at Post Office's New York-Chicago and Washington-Chicago experiment in shipping surface mail by air. Guardedly, AAR isn't going to oppose shipment of all first-class mail by air outrightly—a position which would be interpreted as standing in the way of progress.

Instead, the association is emphasizing the high cost of airmail to the government and taxpayer. AAR's president, William Faricy, observed: "On certain high-density longhaul routes, the railroads are moving mail for as little as 11 cents per ton-mile. It has been further estimated that if placed in sealed mail cars, 30,000-lb. loads of mail can be hauled across the continent for as little as 5 cents a ton-mile." The rate set by the Post Office for the experimental air transport of surface mail: 18 to 20 cents a ton-mile.

—Washington staff

AVIATION WEEK VOL. 59, NO. 15 OCTOBER 12, 1953

New Aircraft Procurement Policy:

Wilson Puts Financial Squeeze on Industry

- **Defense Secretary tightens progress payments, orders reduction of inventories built up by companies.**
- **Air Materiel Command freezes fiscal 1954 funds, issues no new aircraft contracts or major re-orders.**

Aircraft industry faced prospects of a double financial squeeze from the Defense Department last week.

Policies causing widespread concern in the industry were:

• **Tightening** of progress payments and reduction of inventories.

• **Freeze** on placing re-order contracts for aircraft from fiscal 1954 funds.

The new Defense Department policy on progress payments and reduced inventories confirmed Defense Secretary Charles E. Wilson's warning to presidents of major aircraft firms in a closed-door Pentagon meeting last June (AVIATION WEEK June 8, p. 14).

Wilson told the industry chiefs he intended to tighten government financing of aircraft procurement and aimed to reduce inventories of aircraft firms by as much as 30%.

▶ **"Just Good Business"**—Wilson defended the new policy in a Pentagon press conference last week as "just good business practice" and charged that some aircraft firms had received progress payments in excess of work actually performed.

"Some contractors have just gotten sloppy about their inventories," he charged. "As long as they could get government money and we gave it freely, they built up big inventories. With the tightening of the money in this country, this situation required emphasis. Some of these contractors collected their money a little early."

The Defense Secretary branded as "foolishness" reports that the new policy of slowing down progress payments seriously would affect profits of the aircraft industry. He conceded, however, that it would force aircraft companies to finance a larger portion of their inventories and that they would have to resort to heavier borrowing to do it.

▶ **$300-Million Slash**—Industry sources were deeply disturbed by the Pentagon directive, signed by Assistant Defense Secretary Charles Thomas on Sept. 15, that outlined the new policy.

They pointed out that the Defense Department does not allow interest the firms must pay on borrowed funds as an allowable cost of doing business and said any additional bank borrowing inevitably would cut heavily into net income.

Wilson estimated that the new progress payment policy would result in a reduction of about $300 million in this type of advance to the industry.

▶ **Minimum Basis**—Thomas' directive, entitled "Control of Progress Payments," said:

"In view of the need to keep the expenditure of public funds within the statutory debt limit, the military departments should immediately take all possible measures to maintain a tight and effective control over progress payments and to exert every possible effort, consistent with established procurement policies, to persuade defense contractors to utilize private capital and financing, rather than governmental financing, to the greatest extent possible.

"This control must be exercised in such a manner as to provide for the replenishment, in accordance with existing contract clauses and regulations, of the working capital of our contractors on a minimum basis commensurate with their actual current production schedule requirements and the minimum inventory lead time for future production under present schedule requirements."

▶ **Non-Government Financing**—In a memorandum passing on Thomas' instructions to USAF's Air Materiel Command, Brig. Gen. Thomas Gerrity, director of procurement and production engineering in the Office of the Deputy Chief of Staff for Materiel, said:

"It is also requested that your implementation emphasize that future individual progress payments on existing and future contracts providing for progress payments will be approved only to the extent necessary to replenish working capital consistent with the policy enumerated in paragraph 2 of the attached memorandum.

"Contracting officers approving individual progress payment will require Air Force contractors to utilize to a maximum extent non-government sources of financing including their own capital, other sources of private financing and existing guaranteed loans before additional individual progress payments are approved."

▶ **Expenditure Squeeze**—Washington sources credited the Thomas directive to the squeeze on the Republican Administration to hold their fiscal 1954 expenditures below the public debt limit.

But Wilson said it was "unfortunate" that any reference was made to the public debt ceiling in the directive.

Pentagon sources said the Defense Department faced the alternative of either slowing progress payments or slowing aircraft deliveries with another production "stretch-out."

▶ **Industry Reply**—Individual aircraft firms had received no indication late last week as to how the new policy would be specifically applied.

They were hopeful that its effects would not be as bad as the policy directives indicated.

In answer to Wilson's charge that the contractors were "collecting too early," some industry sources cited examples where the Defense Department did not pay for aircraft actually delivered, forcing individual companies to extend their bank borrowings to provide sufficient working capital.

▶ **AMC Freeze**—Meanwhile, industry sources indicated there was in effect a virtual "freeze" on issuance of new aircraft contracts by Air Materiel Command with fiscal 1954 funds.

No major re-orders for aircraft have been issued out of fiscal 1954 funds although more than 90 days already have elapsed since these funds became available, the sources report.

Aircraft firms particularly are concerned because another of the Wilson policies outlined at the June meeting specified that contractors would be made liable for any "slippage" in their production schedules. Industry sources pointed out that the lack of re-orders from fiscal 1954 funds already has assured a 90-day slippage on lead time for deliveries under new contracts.

▶ **Industry Jitters**—Some industry sources credit the lack of contract negotiation by Air Materiel Command to a new Pentagon policy aimed at

eliminating letters of intent and doing business with aircraft manufacturers only by firm contracts.

Contractors point out that this would be an excellent policy if contracts were negotiated promptly. If not, production slippages are inevitable, they say, because a contractor cannot begin any production without some legal assurance from the Department of Defense.

Other contractors report that AMC is deferring contract negotiation pending receipt of reports from contractors on their industrial mobilization planning to cope with a full national emergency.

Whatever the reasons, the aircraft industry and its bankers had a bad case of the jitters last week and were looking to the Pentagon for some solid assurance that their fears were groundless.

Aircraft Firm Tests New Catalog Method

A new method of cataloging, storing and retrieving information has been developed as part of a documentation and research program of the Armed Services Technical Information Agency.

In practical industry trials, the system is being evaluated by a West Coast aeronautical company, other commercial organizations and a government agency.

Reports are that the procedure will save up to 80% of the physical space and 75% of the time required by old methods.

The development is seen as a step towards an ultimate machine method for data cataloging and retrieving industry data.

NAL Copters

National Airlines has ordered three 10-passenger Sikorsky S-55 transport helicopters for local service use in congested areas served by NAL, with delivery of the first scheduled late this month.

G. T. Baker, National president, said this is the first time transport copters have been ordered by any U.S. trunk airline. The initial S-55 will be used in the Greater Miami (Fla.) area. Remaining two copters are expected to be delivered before year's end, are slated for use in the Tampa, Fla., and Norfolk, Va., areas.

Maximum speed of the S-55 is 105 mph., still-air range more than 400 mi. In addition to 10 passengers, the S-55 carries a crew of two.

1955 Air Budget Stirs New Fight

Wilson asks $1-billion increase; but JCS, backed by congressional leaders, wants $5.6-billion boost.

Department of Defense will ask for an increase of about $1 billion in the fiscal 1955 budget to bolster air defense of the North American continent, Defense Secretary Charles E. Wilson said last week.

Wilson said he believes "something less than $2 billion" is all that can be applied intelligently to the air defense problem out of the next fiscal budget.

▶ **$40-Billion Bid**—Meanwhile, Pentagon sources indicated the new Joint Chiefs of Staff, headed by Adm. Arthur Radford, is trying to sell a $40-billion defense budget for fiscal 1955.

This would be $5.6 billion more than the $34.4 billion approved by Congress for fiscal 1954.

▶ **Changing Sentiment**—The Pentagon budget talk came amid increasing indications of changing congressional sentiment in favor of a stronger defense budget rather than a balanced budget and reduced taxes.

Washington developments on the defense budget last week included:

• **Office of Defense Mobilization** gave official warning of the Communist threat in its quarterly report, stating:

"Soviet communism remains an aggressive force bent on world domination by subversion if possible, by violence if necessary.

"Soviet Russia is capable of delivering suddenly and without warning the most destructive weapon ever devised by man on chosen targets in the United States.

"Soviet Russia and its satellites have the power to launch local aggressions anywhere along the huge crescent border of the Soviet bloc and thereby endanger the security of the U.S. and the free world."

• **Sen. William Knowland,** new Senate Majority Leader, declared that if Russia scuttles the Korean peace conference, it will be the "warning signal" that the U.S.S.R. is bidding for more time to build up her striking power "for further aggression."

"If that is true," he said, "we ought to put our defenses in the strongest possible position. We would have been put on notice the Communists do not want peace."

• **Rep. W. Sterling Cole** reported that information given to the Joint Congressional Atomic Energy Committee, which he heads, led him to believe the U.S. should spend an additional $15- to $25 billion on continental air defense. Republican Cole said he had changed his mind on cutting defense spending.

• **Sen. Stuart Symington,** former Secretary of the Air Force, continued his attack on the Administration for putting "figures before forces."

With "initiative" and "surprise" on the side of the Soviet Union, as the aggressor, the Democrat said, "the Communists may well have the atomic advantage right now. These two assets could be decisive in an A-war, or even worse, in an H-war. For the first time in our history we have an enemy who, if he exercises the initiative, may well have military superiority over us."

Pointing out that "the day after the President very wisely pointed up that in this hydrogen age no sacrifice is too great for our society, the Secretary of the Treasury assured that income taxes would be heavily cut next year," Symington commented: "it will be interesting to see which policy wins out."

Cancelation of 748 combat planes shortly after the congressional adjournment, he said, was inconsistent with the Defense Department's pledge to Congress that "not a single combat plane" would be eliminated as a result of a $5-billion slash in USAF's budget.

"I knew their real plans," Symington declared, "and so I said then, and say now, that this method of putting over reduced military strength to the Congress and the people is not in the American tradition."

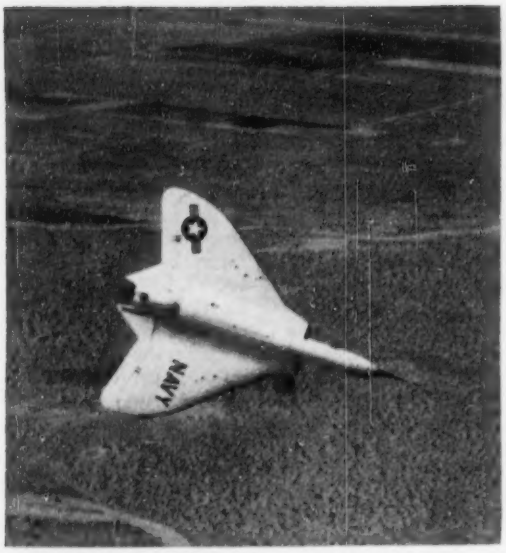
• **Sen. Henry Jackson** added to the Democratic badgering of the Administration for defense cutting.

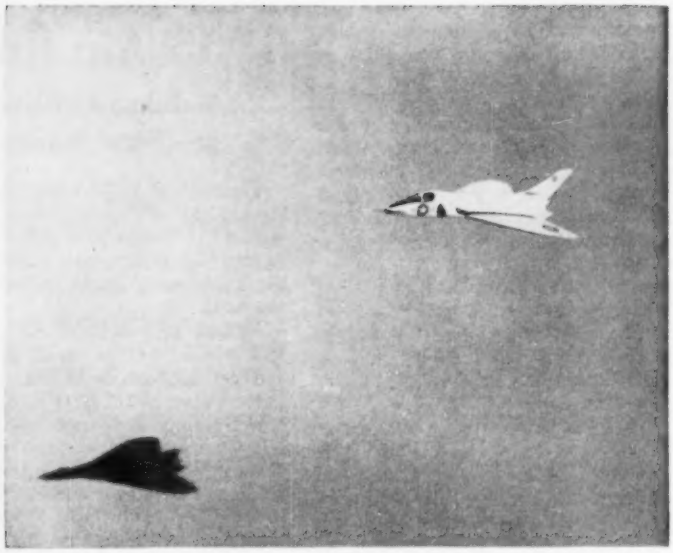
"The people are worried about the state of national defense," he declared, "and are ready to continue paying high taxes to build it up. If the Republicans think they must cut taxes in order to please the people, they are mistaken."

▶ **ODM Program**—Pointing out that the requirements of the partial mobilization program have now been largely met, Office of Defense Mobilization reported that plans and programs are being worked out to:

• **Develop and maintain** a strong mobilization base. An inter-agency defense facilities maintenance board, under ODM Director Arthur S. Flemming, is being created to handle concrete problems involved. ODM's overall policy is to store machine tools and equipment in or near shut-down plants where they would be utilized in an emergency.

• **Meet new emergencies.** The submission of full mobilization military requirements, expected in November, will permit ODM to complete the first overall evaluation of U.S. potential.





PLANFORM OF SKYRAY'S modified delta-wing design is shown clearly in these two unusual photos made during recent speed trials.

753.4 Mph.

- **Prototype F4D shatters world's speed record.**
- **Bat-wing Skyray's top mark hits Mach .96**

By William J. Coughlin

Salton Sea, Calif.—Navy Lt. Cmdr. James B. Verdin returned the world's speed record to the U.S. Oct. 3 when he streaked his Douglas F4D Skyray over a measured course on the shore of this inland sea at an average speed of 753.4 mph.

His four passes all exceeded the eight-day-old British mark of 737.3 mph. set by Mike Lithgow in a Supermarine Swift on the Libyan Desert.

► **Mach .96**—Verdin's times were 746.075, 761.44, 746.053 and 759.499, National Aeronautic Assn. officials report.

Temperature of 98.5 deg. put the speed of sound in the neighborhood of 792 mph., indicating his top Mach number (at 761 mph.) was .96.

The spike-nosed Navy interceptor turned out by Douglas Aircraft's Ed Heinemann and his team of El Segundo engineers thus became the first carrier-based plane to hold the world's speed mark.

Earlier attempts by Verdin to surpass the British mark had been plagued by sand storms and mechanical troubles (AVIATION WEEK Oct. 5, p. 16). But the 35-year-old Navy test pilot said the Skyray functioned perfectly on his record-shattering flight.

► **20,000-Lb. Takeoff**—The Skyray was loaded with some 700 gal. of pre-cooled fuel at the El Centro Naval Auxiliary Air Station, 40 mi. southeast of the Salton Sea course.

Weight of the aircraft—which has a wingspan of 33 ft. 6 in. and a length of 50 ft.—was 20,000 lb. at takeoff.

It burned some 3,450 lb. of fuel, using approximately 575 gal. on the 20-min. speed run.

► **Prototype Skyray**—The F4D flown on the speed run is not a production model. It is the second of two prototypes of the bat-wing interceptor built for the Navy by Douglas.

The Skyray in which Verdin set his record was powered by a Westinghouse XJ40-WE-8 engine developing 11,600 lb. thrust with afterburner.

The first prototype—is now at Patuxent River, Md., for carrier qualification trials.

Production models of the F4D, soon to come off assembly lines at Douglas-El Segundo, will be equipped with P&WA J57 engines that will turn up 15,000 lb.

SKYRAY SKIPPER JAMES VERDIN: The afterburner was like a kick in the pants when it boosted on 30 seconds before each pass.

F-100: 758 Mph.

North American Aviation failed last week in its first attempt to return the world's speed record to the Air Force when the F-100 fell short of the Navy's Douglas F4D mark.

Lt. Col. Pete Everest sent the new supersonic interceptor over the same Salton Sea course where Lt. Cmdr. James Verdin set the record with the Skyray. Although its J57 turbojet pushed the F-100 up to 758 mph. on the try last Monday, it did not top the Navy mark by the required 1% on its four passes.

Temperature for the speed run was 97.8F, slightly less favorable than when Verdin set the record in the Skyray.

At mid-week NAA was planning another record attempt.

thrust with the use of an afterburner.

▶**Afterburner Kick**—After his final pass Verdin hauled back on the stick and streaked upward out of sight in a white-flashing climb of triumph. It was apparent the Navy pilot was certain he had shattered the British mark, a feat he had failed to accomplish a week earlier.

He said later a crosswind that set up a slight turbulence on the course bothered him very little.

"I turned the afterburner on about 30 seconds before entering the course on each pass and I could feel it like a kick in the pants when it boomed on," he commented.

Aircraft Inventories Total $2.4 Million

Aircraft and parts manufacturers nearly quadrupled their inventories in 1952 and spent close to eight times as much money on new plants and equipment as they did in 1947, an advance report on the Census Bureau's 1952 survey indicates.

The industry's inventory totaled $2,402,345,000 at the end of 1952. Of the total, manufacturers had $113,968,000 in finished products and $2,288,377,000 in materials, supplies and work in process.

In 1951, the total inventory figure was $1,640,180,000, of which $92,967,000 was in finished products and $1,547,213,000 in materials, supplies and work in progress.

At the end of 1947, the total was $683,713,000, representing $50,732,000 in finished products and $632,981,000 in materials, supplies and work in progress.

Aircraft manufacturers made a total investment of $203,185,000 in new plants and new equipment last year. New buildings and plant additions accounted for $125,246,000 and $77,939,000 for new machinery and equipment.

During 1951, the aircraft industry spent $153,032,000 on its own development, investing $73,315,000 in new structures and plant additions and $79,717,000 in new equipment and machinery.

The industry invested $27,867,000 in 1947. Of this amount $9,016,000 was for new buildings and the remaining $18,851,000 was spent for new machinery and equipment.

F4D Picture

If your Oct. 5 copy of AVIATION WEEK had a picture of the McDonnell F3H (see p. 30 of this issue) accompanying the Douglas F4D speed record story, forgive us. Several hundred such copies were in the mails before the makeup error was corrected.

Global Airlines

- **IATA sets course for higher traffic volume.**
- **Group urges governments to keep hands-off policy.**

By Lee Moore

Montreal—International Air Transport Assn. last week set a course aimed at ringing the globe with an ever-increasing number of passenger and cargo planes crossing national boundaries freely.

IATA Director General Sir William Hildred, in opening the ninth annual general meeting of airline executives, said the world's air carriers this year will carry more than 50 million passengers, an increase of about 5 million over 1952.

▶**IATA Power**—The association is the world's air parliament, more efficient than most governments because its motivation is business enterprise—more profit for its members through increased service at lower costs.

What the association at this session seeks more than anything else is governmental hands off the delicate airlines economy balance for two to three years while the carriers themselves try to make good on new low-fare coach expansion.

Sir William told AVIATION WEEK that low fares must raise volume enough to increase profit. It will be a success both for business and the public, he said, if governments will restrain themselves from exercising their veto powers at IATA conferences and from levying more taxes and fees on carriers during their development period (AVIATION WEEK Oct. 5, p. 13).

▶**Montreal Assembly**—Chief executives of most of the world's international airlines gathered here for the session. It is their annual opportunity to exchange broad ideas after a year's technical and economic bickering and spadework by committees and central working groups.

Purpose of this meeting is for airline executives to ratify compromises and development programs hatched during the working year.

At mid-week, most of the IATA programs for this assembly still were tied up in executive sessions.

The annual assembly, with all member nations' airlines casting one vote only on each resolution, is the basic source of authority for IATA. Membership is open to all airlines certificated by United Nations governments. In eight years, it has accomplished these things to accelerate civil air transport development and traffic volume that rival governments or individuals never might have done alone:

- **Cut unit costs** per seat-mile and passenger-mile steadily, despite rising cost of labor and materials.
- **Cut passenger fares** as much as 50%, and established at IATA traffic conferences some 30,000 international rate schedules that are universally honored.
- **Standardized technical developments** and terminology of nearly 70 nations' aircraft and airways.
- **Effected a single world currency** for air travel through unrestricted interline-bookings and account clearances.
- **Cut customs** and immigration restrictions and red tape.
- **Avoided trade quotas** and other quantitative restrictions that might have existed on the airlines commodity—transportation. Through hundreds of bilateral international government agreements accomplished through pressure for IATA mutual benefits the airlines have avoided restrictions on flight capacity and frequency. Their aim eventually is a single agreement, but right now the emphasis is on holding the line against the recent trend of some nations to hedge on their bilaterals.
- **Prevented international rate wars.** By fixing nearly all international rates near cost, IATA has forestalled the ever-present danger of a nation seeking prestige by over-subsidizing its airlines so much that it could offer below-cost fares and ruin all competition and/or precipitate price wars.

▶**IATA Politics**—IATA has two main functions: technical cooperation which generally is above criticism, and the price standardization of agreements, which are criticized in some quarters. But the resultant avoidance of national price and subsidy wars is what makes possible the vital government approval of IATA resolutions.

All IATA rate agreements, on 30,000 rates, have required unanimous approval of the governments concerned. Less than 5% of these agreements have been vetoed by governments at various times in the past.

The requirement of unanimous airline and government agreement is both IATA's strength and its weakness. Without it, world air transport, now as unrestricted for the passenger as other interstate travel (except for customs and immigration red tape), would be as restricted as international commodity movements.

Weakness of the IATA's requirement of unanimity is, of course, that one line or its country can obstruct progress on occasion. However, the mutual profit incentive to IATA members has prevented this far better than could the United Nations or a similar body.

Wilson Debunks H-Bomb Threat

Defense chief says Russia lacks aircraft capable of delivering successful attacks against U. S.

The Russians will have aircraft capable of delivering hydrogen-bomb attacks against the United States in about three more years, Defense Secretary Charles E. Wilson estimated in a Pentagon press conference last week.

Wilson said he does not believe the Soviet Union has either the aircraft or the bombs required for this type of operation at the present time.

The Defense Secretary disagreed with estimates of Gordon Dean, former chairman of the Atomic Energy Commission, and Arthur Flemming, head of the Office of Defense Mobilization, that Russia would have this capability much sooner on the ground that his own information "was more factual and technical" than reports available to other people.

▶ **Reason to Worry**—"We give the Russians credit for having aircraft that they just don't have," Wilson said. "Russia couldn't wage a successful war now even though she might have some initial success. The preponderance of productive capacity and scientific skill is still in the free world and not in Communist territory.

"We now have a strong military position. If I were the Russians looking at us, I think I would have every reason to be worried. We must accept the reality of Russian military strength but remember that they have no incentive to start a war unless they have good reason to think they can win. If we can demonstrate that they will face sufficient opposition, they won't try to start a war."

▶ **Improved Defense**—Wilson revealed that the Defense Department is having difficulty with Canada in integrating U. S. and Canadian types of early-warning networks into a single continental defense system.

Assistant Defense Secretary Donald Quarles, in charge of research and development, said research and planning for a continental air defense system has not reached a point where a decision could be made on how much and what kind of equipment would be required.

He estimated that an additional $500 million to $1 billion was all that could intelligently be invested in improved air defense during the next year.

Wilson said the Defense Department was opposed to complete reliance on an air defense system and firmly was committed to maintenance of strong retaliatory forces as the best means of preventing a Russian air attack.

▶ **Necessary Foundation**—The defense chief reversed his earlier testimony before Congress that basic research had no place in his department to emphasize that it was a necessary foundation for a military development program and to offer assurance that he actually had taken no steps to de-emphasize basic research.

He said he had been concerned about reducing the overhead costs of pure research in educational institutions and insisting that the money be spent on actual research work rather than on upkeep of the institution.

▶ **R&D Position**—In acknowledging his current position on military research and development, Wilson said:

"The research and development program of the Department of Defense is fundamental to achieving and maintaining a reasonable posture of defense for the nation.

"Technology, through providing us with superior weapons and the knowledge of how to use them, offsets the possible greater numerical superiority of a potential enemy and gives us a military force superior to any in the world. The Department of Defense has and must continue to have an effective research and development program.

"We must keep our weapon systems ahead of all potential enemies in time of peace with the hope that through being prepared we will deter a possible war.

"The interval between the onset of aggression and destruction is so short that we cannot afford to delay our development of new weapons until an enemy strikes. We must recognize that the weapons required to repel aggression cannot be and are not conceived and developed overnight. It takes months and years to perfect and produce the new weapons and countermeasures which we are depending upon to insure our safety."

▶ **Minimum Requirements**—"The Department of Defense is at present spending more money on research and development than it has at any time before in history. Actual expenditures for research this year will be about $1.3 billion, and we have approximately 8,000 specific research projects financed by these funds. This is approximately the same as the amount of money appropriated by Congress for research and development for fiscal 1954.

"During the four years 1947-48-49-50, the amount spent averaged about $500 million per year, so we are currently spending about 2½ times the money for research and development that we did before the Korean war.

"Perhaps we are currently spending a little more than the minimum requirements in an effort to make up for the lack of expenditures in previous years."

Hydro-Ski Liner?

Toronto—Civil transports equipped with hydro-skis would cause a "near revolution" in airline operation, a committee of the American Association of Port Authorities reports.

The group describes the hydro-ski, successfully tested on Convair's XF2Y-1 Sea Dart (AVIATION WEEK Aug. 3, p. 15) as "one of the most startling" aircraft developments.

"We can begin to unsnarl the critical airport tangle by water-basing all of our transocean and coastal services—nearly 40% of our total passenger-miles flown—and possibly some of our inland ones as well," the committee forecasts.

"Because of the . . . ease of landing in instrument weather, there will not be any need for present 'stacking' procedures with their consequent airport tieups, delays and wear and tear on passenger nerves.

"Seaplanes will be able to dock like ocean liners. They would not be able to land in mid-Atlantic in a raging gale, but they could do so in any reasonable weather and would never be far from quiet water runways beside the islands along their Great Circle routes . . ."

B-36 Global Training

Strategic Air Command sent a 10-bomber squadron of B-36s to a North African air base last week, while another squadron prepared for a flight this week to Thule, Greenland.

A squadron of the Seventh Bombardment Wing, based at Carswell AFB, Tex., will train about 11 days in North Africa. The Thule-bound squadron from the Sixth Bombardment Wing is based at Walker AFB, Roswell, N. M.

Both moves are part of SAC's global mobility program which deploys bomber squadrons to distant bases quickly and provides operational training overseas.

500th Copter

Hiller Helicopters has delivered its 500th production model, an H-23B for Army, from its Palo Alto, Calif., plant. Most Hiller copters have gone to Army, but some also have been sold to Navy, Air Force and military and civilian agencies.

Engineers Plot Economy Course

Better planning, better coordination are two paths to more air power per dollar, SAE forum holds.

Los Angeles—Since the present economy wave hit the nation's armed services, U. S. military men have been struggling with the question of how to get more air power per tax dollar.

They got an assist this month when aircraft industry engineers, gathering here for the National Aeronautic Meeting of the Society of Automotive Engineers, tackled the same problem.

(See story on page 35 for earlier report on SAE meeting.)

▶ **Two Answers**—Engineers at the two-day Aircraft Production Forum, which preceded SAE technical sessions, came up with two answers:

- **Better pre-production** planning.
- **Closer coordination** between departments at each plant.

These two solutions to skyrocketing costs popped up in seminars on plant layout, procurement, tooling, quality control, materials handling, manufacturing costs, machining, forming and change control.

▶ **Advance Spending**—Sometimes you have to spend dollars to save dollars, concluded at least one group.

"Quality control too often is on the end of the line when it comes to passing out the money," complained one quality control engineer. Advance planning and spending is necessary, he said, to prevent a situation where "elegant machines turn out parts like hotcakes, while inspection stands around trying to check it with its thumbs."

To avoid this, the seminar agreed, designers and quality control engineers should select the important inspection points early so they can prepare the tooling engineers.

More pressure should be put on management to design and manufacture inspection tools simultaneously with production tools, the quality control group concluded.

▶ **Practical Approach**—In process inspection versus end-inspection came up for heated debate.

"In-process type of inspection is a very definite must," insisted G. A. Covington, Convair's quality control manager. "We cannot tear an airplane apart at the end of the line. . . . No other approach is practical."

But E. S. Barnhart of Solar Aircraft Co. pointed out that in-process inspection is wasteful on items where final inspection can do the job. Barnhart cited an instance where Solar discovered in-process inspection was not reducing failures by a sufficient margin: The inspection was costing more than it saved.

Solar dropped the in-process inspection, stepped up education of production workers and checked basic tooling as alternative solutions.

"Final inspection is protection for the customer; in-process inspection is protection for the manufacturer," said Solar's quality control manager.

The panel agreed the answer depended on the complexity of the item in question, whether it was a complete aircraft or a component. Pre-planning is the important thing, summed up panel leader R. S. Catlin of Northrop Aircraft, so that "you can inspect only where inspection is needed, thus saving money and turning out more planes per dollar."

▶ **Bonus for Quantity**—Question of a time standard for inspection also brought varying opinions.

"You cannot set a time standard for inspection in the aircraft industry," argued Convair's Covington. "Inspection hours are directly proportional to the quality of the product."

Barnhart insisted that with the proper allowance for variables, quite a few operations could be set on time standard although this might require an off-the-line station in the event of poor quality production.

D. A. Hill, director of quality control at Hughes Aircraft offered an even more radical opinion: "Not only can you put inspection on time standard," he said, "but you can pay a bonus for quantity."

This requires an inspection accuracy group to double check the inspections, he admitted, but cited Western Electric and General Electric as firms that have found this method satisfactory.

"I don't know what is so peculiar about the airframe business that some think this couldn't be used," he commented.

▶ **Washable Coating**—Another unusual suggestion came out of the materials handling sessions: Perhaps too careful treatment of delicate parts is needlessly increasing the cost of handling.

"We have poured money down the drain on packaging too elaborately," said an engineer. He reported his company found shop personnel handle delicate equipment carefully regardless of how it is packaged.

It was apparent at the materials seminar that protection of parts prior to delivery by washable protective coatings is increasing in popularity. This method is in use at such plants as Douglas Aircraft Corp.'s El Segundo Division and Boeing Airplane Co.'s Wichita factory. It drew favorable comment from several engineers.

▶ **Well-Oiled Sheet**—Handling of stainless steel sheet varies greatly, the seminar discovered. A spokesman for one company said his firm keeps stainless sheet indoors and well oiled.

But representatives from both Solar and Ryan Aircraft reported their companies store stainless sheet outdoors for long periods with no treatment, despite exposure to corrosion from San Diego bay.

Greatest damage, they noted, comes from grit blown over from the nearby airport.

▶ **Too Many Changes**—Engineers discussing control of manufacturing costs agreed with Secretary of Defense Charles E. Wilson on this point: Too many changes are required once an aircraft is in production.

They blamed both the military and the industry for this, industry for poor designing and the military for requiring

MORE POWER FOR TWIN NAVION

Temco last week delivered its first Riley Twin Navion conversion featuring 150-hp. engines, a new cowling with large propeller spinners and improved exhaust to reduce engine noise. Price, $28,500. Earlier Riley Twins used 140-hp. engines.

too many changes after the start of production.

"I don't know who can tell us how many changes there should be in an airplane," said Morrie Harper, supervisor of cost analysis and standards at Douglas-El Segundo, "but I am sure of one thing—there are too many changes."

▶ **Subcontractor Concern**—Procurement discussions brought out increasing concern on the part of subcontractors as to their place in the air power program.

"We are receiving increasing numbers of inquiries and visits from subcontractors and vendors as to their future in the program," said Brig. Gen. K. D. Metzger, chief of the Production and Resources Division of the Air Materiel Command.

Metzger indicated his belief that short-term subcontracts may be costing USAF money as well as upsetting the subcontractor.

Lower per-unit costs would result in greater economy if prime contractors would place subcontracts for the same duration as the prime contract, he said. The Air Force is very concerned with the cost penalty of not placing extent-of-contract orders.

A representative of Convair, holder of the first air weapons system contract, commented that his company is placing subcontracts for the entire forward commitment of the prime contract.

Another warning to industry on lead times came from General Metzger: "We are confronted with the need to reduce manufacturing lead time. I think the Secretary of Defense has made himself clear . . . lead times with which we are confronted today are in many cases unrealistic and have a bad effect on the budget."

How closely should preliminary design engineers work with tooling engineers? Where should the line of responsibility be drawn? These questions came up in the tooling sessions.

▶ **Least Expensive Path**—Some firms strongly emphasize such cooperation, while others take a more lukewarm attitude.

G. A. Evans, tooling manager of the Glenn L. Martin Co., pointed out that tooling is of prime concern in cost. Therefore, he felt, the tooling engineers should make it very clear to the design engineer what his ideas cost.

At the Martin plant, said Evans, tooling representatives work right in the engineering department. Douglas-El Segundo and Convair, among others, also follow this policy.

Others felt restriction of designing by tooling engineers should be cautious, that such cooperation should consist only of showing the design engineers which of two desired paths is the least expensive. Most panel members agreed responsibility must rest with the design engineer.

▶ **Transonic Design**—At the close of the Aircraft Production Forum, the SAE engineers opened technical sessions devoted to the basic design, production and operation of aircraft flying supersonically at 70,000 ft. in extremes of heat and cold.

A paper delivered by Lockheed Aircraft Corp.'s Clarence L. (Kelly) Johnson seemed destined to become the most controversial. In it, Johnson defended the straight wing for supersonic flight and attacked some of the pet theories of delta-wing adherents.

The SAE's Manly Memorial Award went to Robert E. Gorton and Bruce E. Miller of Pratt & Whitney for a paper on "Instrumentation for Aircraft Gas Turbine Development," delivered at the society's annual meeting in January 1952. —WJC

First Bulk Airmail Flights Take Off

First-class, three-cent mail took to the air for the first time simultaneously in Washington, New York and Chicago last week.

Postmaster General Arthur Summerfield, author of the experiment to send more mail by air (AVIATION WEEK Sept. 28, p. 20), called the occasion a "milestone and a big day in the history of aviation."

In brief, pre-takeoff ceremonies at Washington National Airport, American Airlines DC-6 Flight 269 became the first airliner to carry regular mail out of Washington.

Hostesses representing American, United, Capital and Trans World Airlines drew to determine in what order the airlines would carry the small white mail bags.

AA was followed by Capital, TWA and UAL. They shared 2 million Chicago-bound letters. The experiment will be carried out for a year with a limited volume of first-class mail flown on Washington-Chicago and New York-Chicago routes.

Last week's flights took off slightly more than 43 years after Charles Hamilton flew the first airmail, consisting of three unofficial messages, from New York to Philadelphia, June 13, 1910.

RAILS start their own mail propaganda with ads such as this one in Editor and Publisher.

CAB Freezes 75% Coach Fare Ceiling

Certificated domestic aircoach fares will continue indefinitely no higher than those now in effect, Civil Aeronautics Board said last week in its new coach policy statement.

CAB continued current coach ceilings of not more than 75% of the corresponding first-class tariff, describing the 25% differential as the minimum cost distinction between flight services.

▶ **New Scales**—Tourist tariffs no longer will carry specific expiration dates, and special coach reports will not be required after Jan. 31, 1954. Current rates are scheduled to expire Dec. 31.

New fares scales will not be subject to specific cents-per-mile ceilings under the new policy. Present ceilings are four-and-a-half cents a mile for high-density tourist transports during normal travel hours, four cents a mile for any plane operating night coach service.

▶ **Refund Policy**—The Board urges carriers to consider adopting a policy of refunding actual fare differences where operational situations require airlines to use a high-density aircraft on a first-class schedule when there is an applicable coach tariff. Where there is none, CAB suggests a 25% refund.

Any new coach services or extensions of existing coach flights, the Board says, should limit hours of departure to off-peak periods and keep seating density to a minimum for safe carrying capacity.

Minimum seating densities for coach aircraft used in tourist services should be: DC-4, 64; DC-6, 72; DC-6B, 76; Constellation, 79; Super Constellation, 88.

Assembly Line Brain

Los Angeles—Ramo-Wooldridge Corp. has announced a $330,000 contract from Thompson Products, Inc. for development of electronic techniques for automatically planning and controlling the purchase, storage and flow of raw materials and parts of modern factory assembly lines

PIASECKI HELICOPTER CORP. uses 45 Timken bearings in transmissions, pitch bearing cases and landing wheels.

TIMKEN® bearings help "flying lifeboats" rescue 16 from stranded ship

AFTER the supply freighter Grommet Reefer crashed on rocks and split in half last December off Leghorn, Italy, four Navy HUP-1 Piasecki helicopters picked up 16 seamen and carried them to safety.

45 Timken® tapered roller bearings in each helicopter's fore and aft transmissions, pitch bearing cases and landing wheels give the dependability needed—whether it's a routine flight or a rescue mission. The tapered construction of Timken bearings carries radial and thrust loads in any combination. Shafts are held in positive alignment. Gear mesh is smoother, wear reduced.

The Timken bearings help save weight by eliminating the need for extra thrust bearings. And Timken bearings practically eliminate friction because of their true rolling motion and incredibly smooth surface finish. There's more power for the blades—less left in the bearings.

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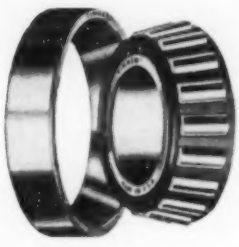

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Pilot Visibility

- **Collision hearing studies blind airliner cockpits.**
- **Aviation authorities offer many possible solutions.**

Transport cockpit visibility problems dominated Chicago hearings on the recent inflight collision of American and United Air Lines Convairs at 11,000 ft. above Michigan City., Ind.

Testimony at the Civil Aeronautics Board hearings, heavily attended by industry spokesmen, failed to produce any simple solution to the growing problem of crowded airways.

But several possible developments emerged. A few of the possibilities mentioned at and around the hearing by industry and government representatives:

• **Flasher beacons** of high intensity—already being installed by some airlines, including American and United.

• **More windows** could be cut in Convairs and other transport types, a company spokesman indicated. The modification would be expensive.

• **Periscope mirror installations** were discussed by some, scoffed at by others.

• **Flight dispatch coordination** may volve to reduce the odds of inflight collision. However, most observers agreed such plans must be developed cautiously and may not be practical.

▶ **Blind Cockpits**—Convair-Liner cockpit visibility was shown by Civil Aeronautics Administration technical development photos to be equal to or better than most other contemporary designs.

Pilots of both aircraft testified that they were on the alert but never saw the other plane (AVIATION WEEK Sept. 7, p. 75). Some passengers did see the planes converging, and three said they feared collision.

Transport cockpits virtually are blind except for a wide, shallow cone of vision ahead. Lack of windows above, below and behind the pilots causes part of this. Wing and engine nacelles cut down much of the rearward vision obtainable from the side windows that do exist.

▶ **The Accident**—The American and UAL Convairs left Chicago one minute apart just before dark Aug. 26. They were dispatched under visual flight rules, American to Detroit and United to Cleveland. Both chose the best altitude, 11,000 ft.

Without seeing each other, they later converged while cruising on the same airway at about 10,800 ft.

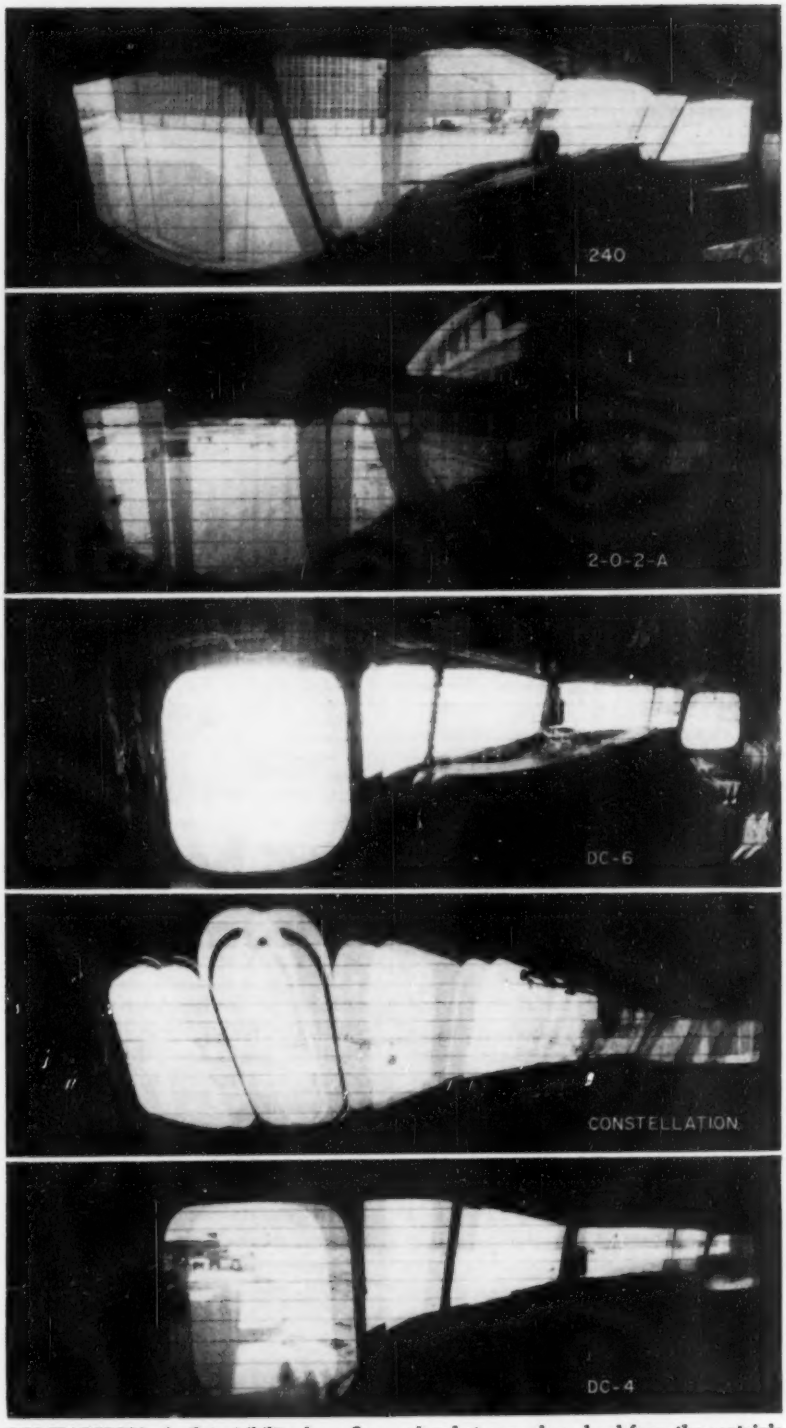
It was dusk at that altitude and time.

The UAL plane was slightly behind and to the side, passenger testimony indicated. It brushed under the AA Convair. Its prop gouged the American transport's fuselage.

The American prop tore a hole in cockpit roof above UAL co-pilot.

Both planes suffered explosive decompression.

With its radio out, the UAL transport made an emergency landing at South Bend, Ind., and the American plane returned to Chicago. There was no injury or further accident.



COMPARISON of pilot visibility from five modern U. S. airline transports was measured by a CAA-developed swivelling camera placed at normal eye level from the captain's seat. Scale in degrees of angular visibility is the same in each of the five photos.

▶ **Fault?**—Main conclusions as analyzed by official observers at the hearing:

• **Pilots of both planes** maintained that

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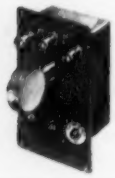

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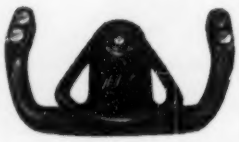

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New IFR Rules

Air Coordinating Committee's navigation panel has recommended tighter traffic control rules in high-density areas.

Instrument flight rules would prevail in big airport areas whenever visibility is less than five miles —compared with today's three-mile limit.

Washington National Airport would be first affected by the change.

ACC said this would help prevent air collision, adding that "pilot reports of near-misses have been increasing." The committee said there were 172 mid-air collisions of all types between 1946 and 1952.

IFR rules in control areas do not eliminate the possibility of collision along uncontrolled airways.

Testimony at the Chicago hearing on the collision of American and United Convairs revealed that airline pilots frequently file IFR under VFR conditions to help clear the crowded area. But even this does not guarantee traffic separation, because many other planes in the area are on VFR.

they were on the alert at all times. Company rules prescribe no paperwork at this phase of enroute operations. The United plane, however, was the overtaking transport it appeared from testimony.

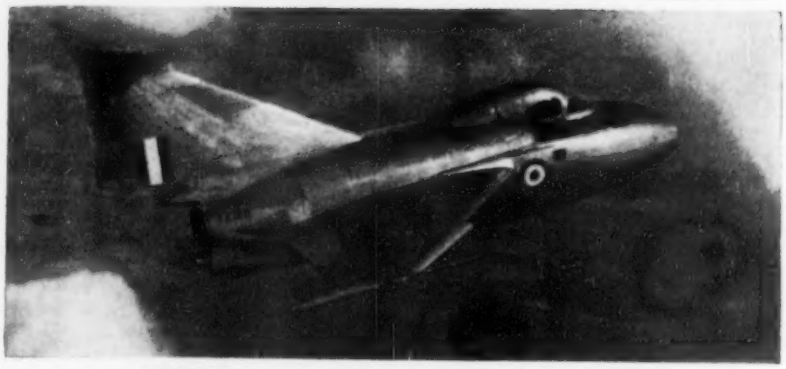
UAL pilots E. H. Brobacker and C. E. Olsen asked that their testimony be immune from self-incrimination (under hearing rules and the Fifth Amendment). The United co-pilot was relatively inexperienced. Brobacker was on his first scheduled flight as a Convair captain on this route.

• **Air traffic control** of CAA was not involved, because enroute traffic separation is not provided under visual flight rules.

• **Law of averages** makes inflight collision under visual rules an extremely rare probability in the nearly infinite number of cubic yards of airspace along a given airway outside the high-density area.

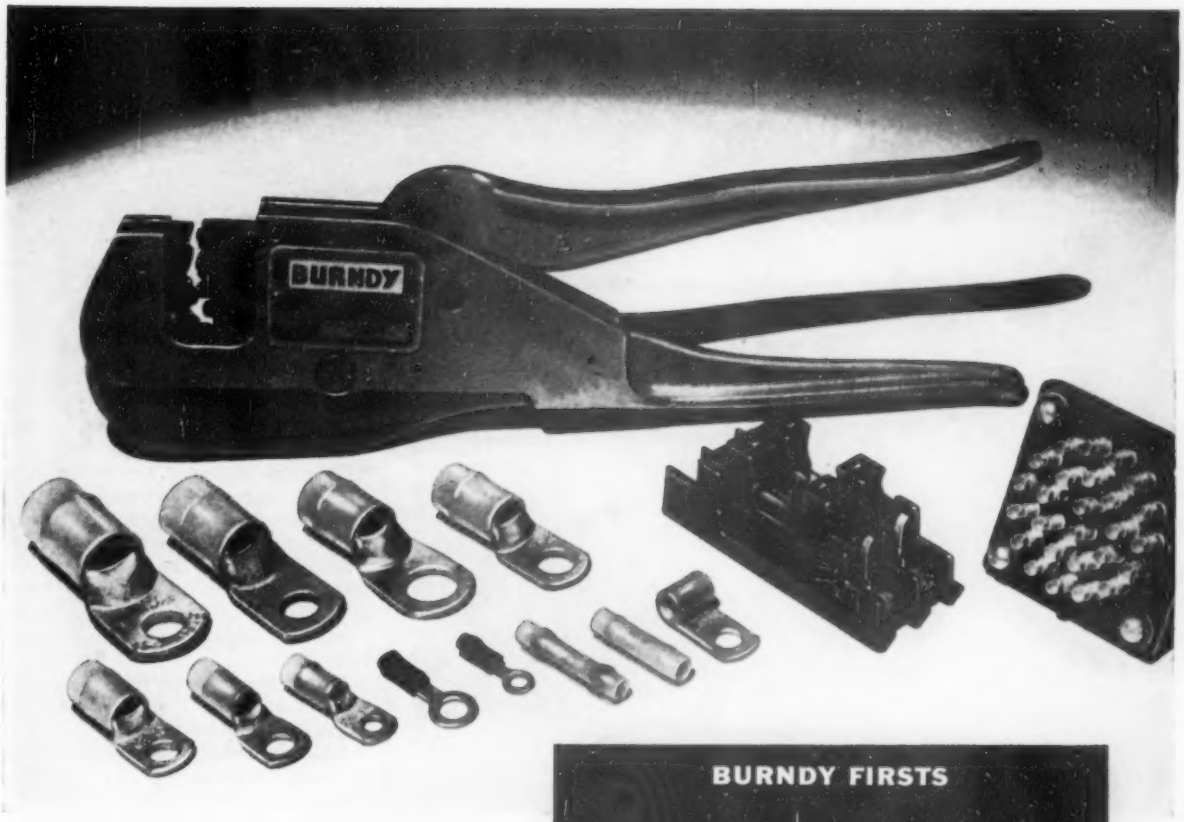
Ryan Enters Modified Navion In Navy Test

San Diego, Calif.—Ryan Aeronautical Co.'s entry in the Navy trainer competition that opened at Pensacola, Fla., Sept. 28 is a new version of the familiar



FAIREY'S DELTA-WING RESEARCH F.D.1

New flight pictures of Fairey Aviation's small delta-wing research aircraft, which has completed flight acceptance tests. The F.D. 1, powered by a Rolls-Royce Derwent turbojet, is 26 ft. 3 in. long, has a wing-span of 19 ft. 6½ in. First flight was made in March 1951.



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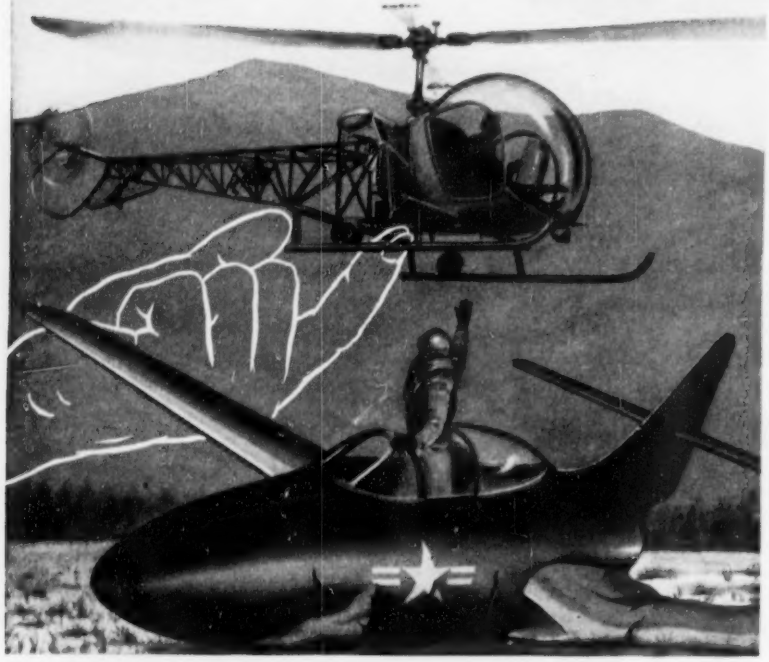

BELL HELICOPTERS play a vital part in rescue and liaison work. Schweizer Aircraft Corporation has given Bell a **production assist** by building the forward fuselage and cabin for the Model 47 Helicopter.

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SCHWEIZER AIRCRAFT CORP.
ELMIRA, NEW YORK

Ryan Navion, the company revealed here last week.

Designated Ryan Model 72 military trainer, the plane features side-by-side seating for instructor and student. Ryan believes this arrangement offers great advantages over conventional fore-and-aft seating.

► **Stronger Structure**—Extensive modification of one of the company's Navions was undertaken to conform with Navy requirements. The Model 72 made its first flight Sept. 5.

Structural strengthening for military acrobatics and additional fuel capacity increased gross weight of the Navion. To compensate for this, two feet were added to each wingtip and the wing was rebuilt for added strength.

► **Changes**—The military-style cockpit has stick controls in place of the wheels on other Navion models; secondary controls were changed to a pedestal arrangement. The Model 72 has conventional rudder pedals. Flight characteristics as a result are somewhat different, company officials told AVIATION WEEK.

Other changes include:

- **Constant** speed propeller instead of controllable pitch.
- **Addition** of four windows to cockpit enclosure and use of flush-mounted windows on canopy.
- **Hand brakes** replaced by toe brakes.
- **Elimination** of nose wheel steering.
- **Addition** of rudder trim tab.
- **More powerful** radio equipment.
- **Double rear** seat replaced by baggage compartment.
- **Former baggage** compartment converted to equipment bay.

Ryan is emphasizing the unconventional side-by-side seating with an illustrated booklet that will be distributed among personnel concerned with the evaluation tests.

Project engineer on the Model 72 is Dave Williams.

First B-57 Squadrons To Form This Year

(McGraw-Hill World News)

London—Glenn L. Martin Co. expects the first USAF squadron of B-57s (Photo-reconnaissance versions of the British Canberra) to be formed by year's end, with first groups in Europe early next year.

The B-57B, night intruder version of the Canberra, will not be ready before "late next year," two Martin representatives said.

The Americans said the B-57 weighs about 4,000 lb. more than the British Canberra. More equipment and heavy engines account for most of the difference.

The B-57B night intruder will have

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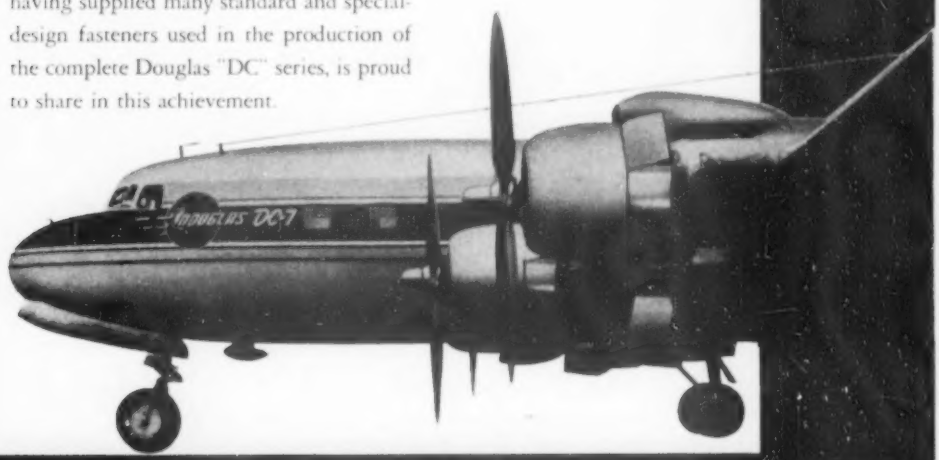

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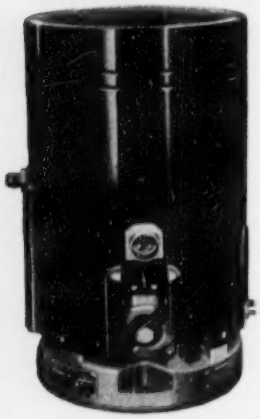

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an altered cockpit housing a two-man crew in tandem, instead of the British three-man crew with one sealed off in the fuselage.

J. Bolles, Martin's chief of sales development, and Jess Sweetser, company chief sales manager, visited English Electric Co. here to tell the British of the handing-over of the first B-57 to USAF (AVIATION WEEK Aug. 31, p. 17). English Electric developed the Canberra.

Bolles hinted Martin might drop Kaiser Metal Products as a prime subcontractor on B-57 wings: "We are on the verge of bringing the wings back because they (Kaiser) haven't held up their end of the job."

Bolles and Sweetser paid high tribute to the British company: "We can't say too much for the handling characteristics of the airplane."

After a visit to English Electric's Preston, Lancashire, production plant, Sweetser added a rare tribute to British production: "The U. S. is supposed to be ahead on jigs and tools, but Preston, with few exceptions, has initiated just as much tooling as we have."

English Electric has delivered more than 300 Camberras to the RAF.

The visitors also let this be known:

- **Martin expects** to get the first 50 to 100 J65 engines for its B-57 from Buick; later engines from Curtiss-Wright.
- **English Electric's** test pilots "Bea" Beamont and B. O. Heath are in Baltimore now trying out the B-57.

RCAF Base Program Costs $400 Million

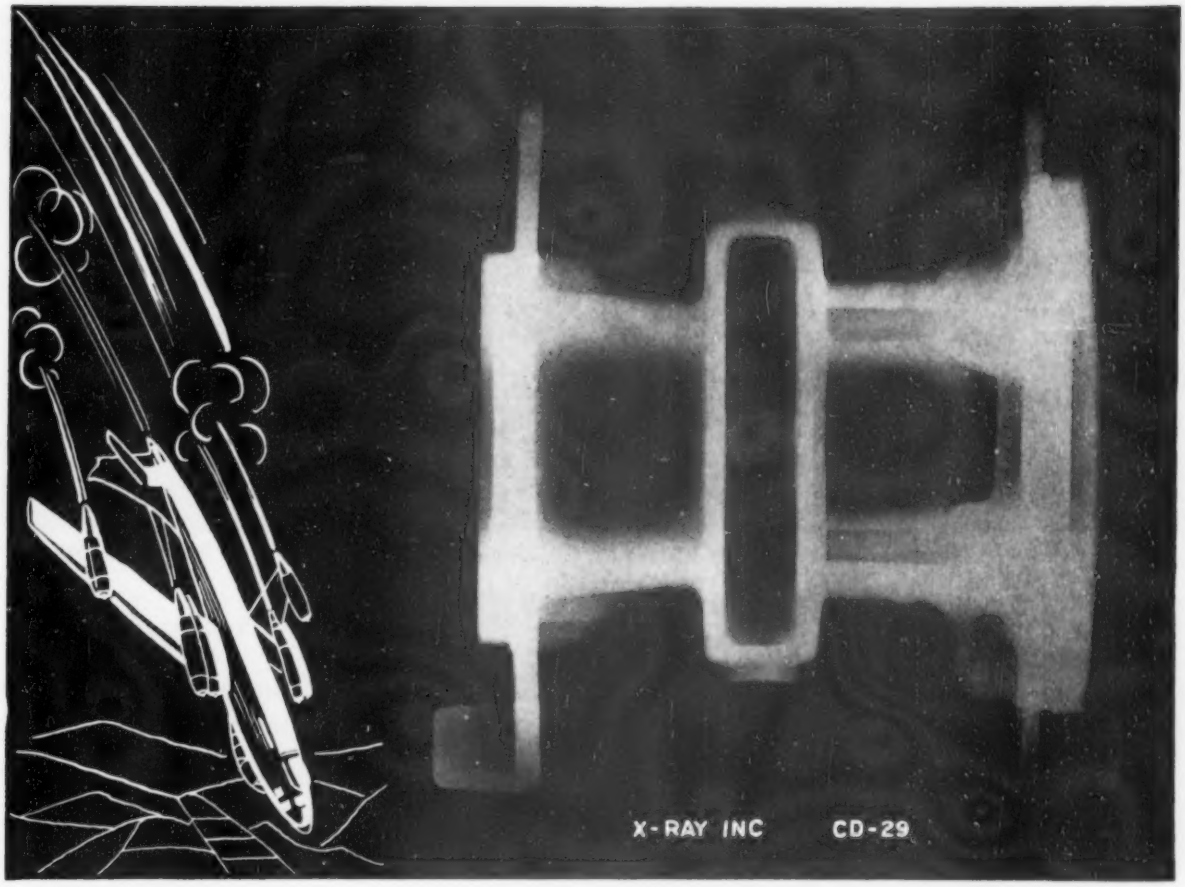
Toronto—Royal Canadian Air Force will complete a $400-million expansion of airports, training bases and gunnery ranges by the end of next year, according to an official estimate.

The construction program centers on extension of runways at permanent RCAF bases and re-activated World War II training stations to meet needs of military jets and large transports.

At civil aviation fields across the country, runways also are being lengthened and facilities improved for regular and emergency operation of RCAF.

The program also includes:

- **Large cantilever hangars** that can be expanded to house big planes of the future are under construction at a cost of approximately $4 million.
- **Two materiel and repair bases,** each covering nearly 20 acres, are being built at suburbs of Toronto and Edmonton.
- **Radar stations** are being extended across the nation, requiring construction of roads, power stations, transmission lines and water systems in previously inhabited bush country.



PICTURE OF A FRUSTRATED KILLER!

This innocent-looking casting is a potential death dealing monster. It's a vital unit for one of America's giant Atomic Bombers. Every single one of these particular parts is x-rayed by us to make absolutely certain that there are no structural defects hidden beneath its surface. For if, while in flight, this part should fail, it could destroy a $10,000,000 plane, its crew and mission. The role we play in eliminating this possibility not only saves lives and planes but it also ends the costly process of machining scrap parts—which is a problem you may have—and one that we can certainly help you with. Write us today for full details on how our method of quality control involving radiography, spectrography, chemistry and metallography can help you cut manufacturing costs. We are also equipped to do radium and cobalt field testing of pressure vessels anywhere desired.

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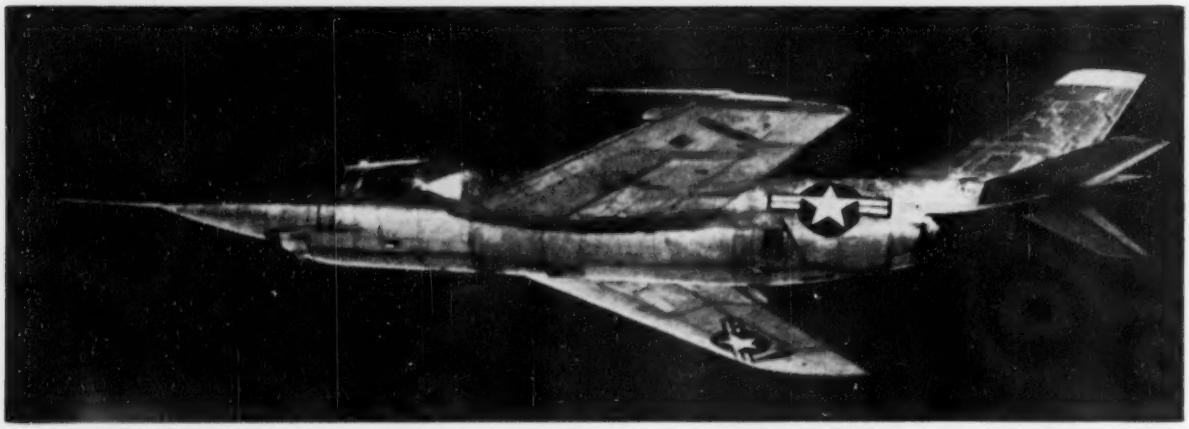
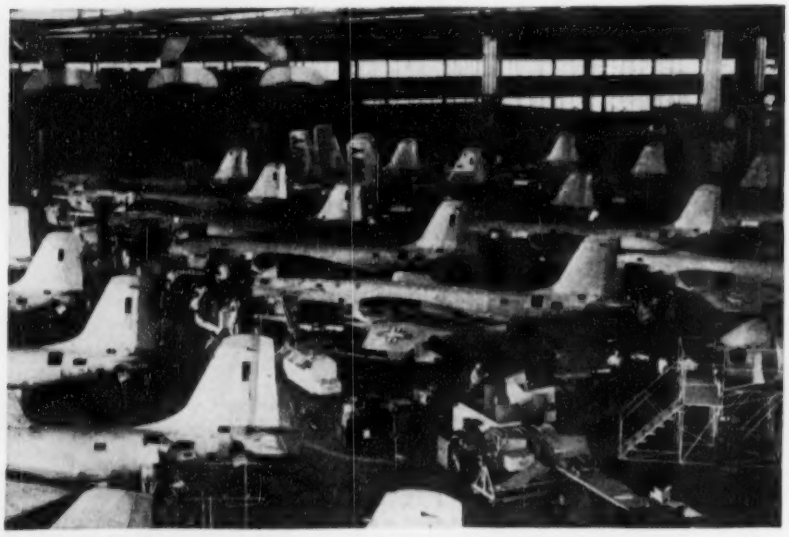


PRODUCTION MODEL F3H-1 Demon, Navy's new transonic jet fighter, soon will replace F2H-3 Banshee on McDonnell assembly lines.

McDonnell Phasing In F3H, F-101 Jets

MUFFLING CHAMBER silences screams of XF-88's twin jets during engine turnup.



FINAL VERSIONS of the F2H-3, to be phased out this fall, roll down production line.

- **Plant expands to meet record volume peaks.**
- **President forecasts high level output through '56.**

McDonnell Aircraft Corp. reports the highest volume of sales and net profit in its 14-year history for the fiscal year ended June 30.

President James S. McDonnell, Jr., forecasts continued operations at the fiscal 1953 level for the next three years, an outlook based largely on production of the F3H Demon for the Navy and F-101 Voodoo for USAF.

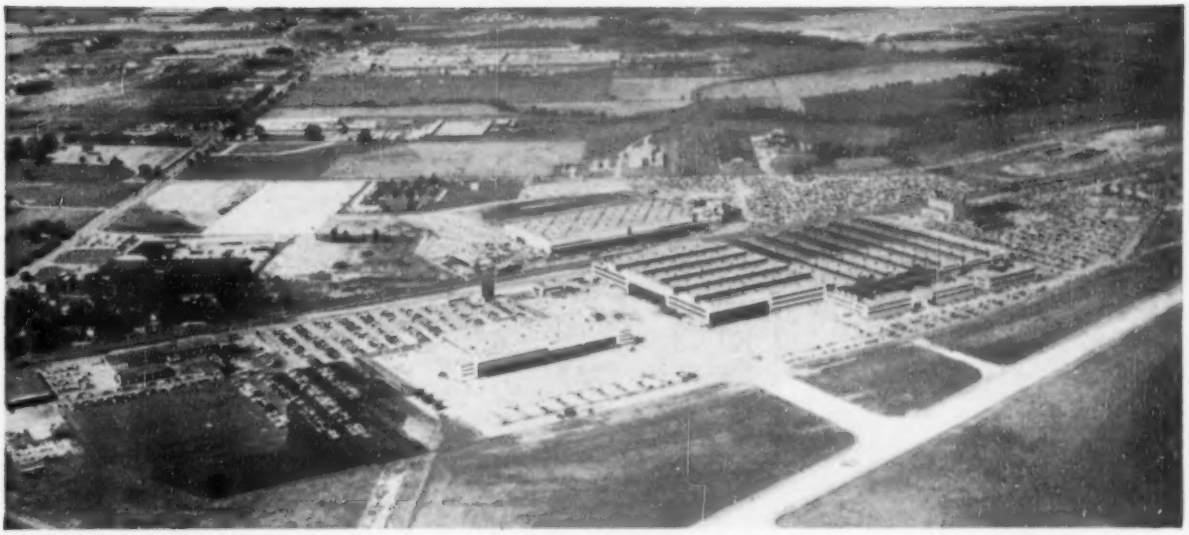
Net income of $4,234,000 was reported for 1953, representing a 3.17% return on investment. This is below the 4% return averaged by McDonnell during its 14 years of operation and less than half the 1950 rate of 7.28%.

▶ **Tripled Sales**—McDonnell's sales have more than tripled during the post Korean expansion, rising from $38 million in 1950 to $133 million for 1953.

Backlog increased approximately eight times from $62 million in 1950 to $496.9 million at the end of fiscal 1953.

Employment at the St. Louis factory tripled from 5,000 persons in 1950 to more than 15,000 in 1953, and plant area expanded from 1.5 million sq. ft. to 2 million during the same period.

▶ **R&D Cutback**—McDonnell reports that its research and development work under military contract has been cut by "several million dollars." He points out that, while its backlog stands at $496 million, government authorized only $366 million to be spent at McDonnell.



McDONNELL FACTORY at St. Louis is nearing completion of a $18-million expansion that has increased space 5-million sq. ft.

This is an indication that McDonnell has some volume of letters of intent that have not been converted into firm contracts.

▶**Demon Production**—McDonnell is nearing the end of Banshee production scheduled to end in the fall with the delivery of the 800th version of this design to the Navy.

Total of 29 Marine and Navy squadrons now are operating various versions of the Banshee.

Final production version is the F2H-3 being built in a photo-reconnaissance and night fighter version.

The Banshee is scheduled to be superseded by the F3H transonic Demon, with production on this model extended through 1955.

For the Air Force, McDonnell is producing the F-101A Voodoo, a long-range penetration fighter, and is tooling for output of the RF-101A, a photo-reconnaissance version of the new USAF jet fighter.

Production orders for both these planes are expected to be substantial.

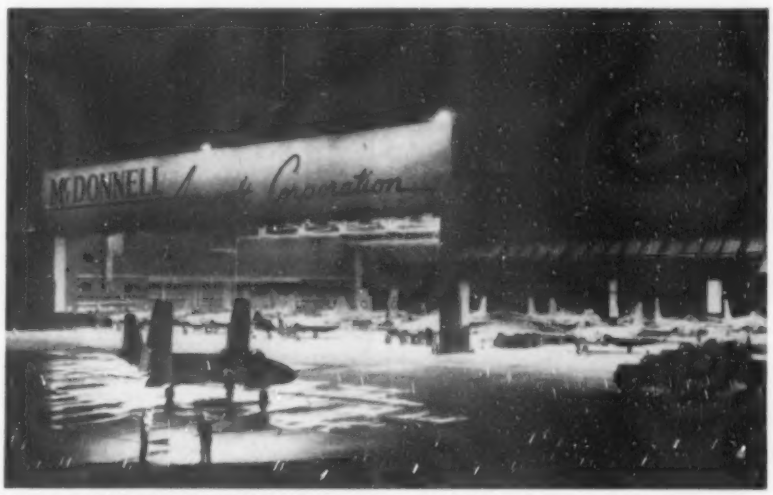
▶**Copter Projects**—In the helicopter field, the company has three experimental projects:

- **XH-35 convertiplane** for the Army and Air Force.
- **XHCH-1 cargo copter** for the Navy.
- **XHBH-1 assault transport** for the Marines.

The Guided Missile Division is continuing its expansion, but no details are offered on specific projects in McDonnell's plant.

▶**$17,999,824 Expansion**—The corporation is nearing completion of a $17,999,824 facilities expansion program spurred by the Korean war.

A $3.6-million hangar and a $1-million propulsion laboratory were completed during fiscal 1953, and a $1-mil-



NAVY TAKES DELIVERY of last Banshee models at Lambert Municipal Airport plant.

NEW LOWSPEED WINDTUNNEL scheduled for completion by McDonnell this year.

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Copper-Constantan
Chromel-Alumel

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AN5540-1 18 MM. iron-constantan Sparkplug-gasket type thermocouple for measuring cylinder-head temperatures. Also available in copper-constantan and in 14 MM size for either material.

AN5540-2 Iron Constantan Sparkplug-gasket type with copper ring for 18 MM plugs. Wire guard and supporting bracket are stainless steel and conductors are protected with flexible heat-resistant sleeving. AN5539 terminals are silver-soldered to leads.

AN5541-1 Iron Constantan Bayonet Type thermocouple with junction located in silver tip. Spring used with this thermocouple will retain its strength despite high temperatures.

AN5545-1 Chromel-Alumel Tailpipe Thermocouple. Insulated with a temperature-resistant ceramic and overbraided with stainless steel wire, this thermocouple is built to withstand severe jet engine service.

We invite inquiries on your temperature measuring problems.

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Manufacturers of Complete Temperature Measuring Systems for Aircraft

NAUGATUCK, CONNECTICUT

McDonnell's Climb

	1950	1951	1952	1953
Sales	$38,688,383	$66,623,014	$81,743,306	$133,531,447
Earnings after taxes	$2,815,219	$3,291,262	$3,064,243	$4,234,301
Earnings per common share after taxes and preferred dividends*	$4.13	$4.82	$4.49	$6.18
Ratio of earnings after taxes to sales	7.28%	4.94%	3.75%	3.17%
Book value per common share	$11.27	$15.80	$19.29	$24.39
Backlog	$62,695,281	$278,636,137	$315,818,517	$496,902,953
Personnel	5,560	8,226	11,258	15,055
Payroll	$21,587,443	$27,438,060	$41,806,245	$62,538,075
Floor area, gross square feet	1,591,311	1,598,153	1,671,611	2,078,539

*Adjusted retroactively for 2-for-1 stock split on Oct. 9, 1950.

lion lowspeed windtunnel is scheduled for completion in December.

McDonnell also contributed $1.1 million as its share of the $6.6-million improvement program to increase the range of the University of Southern California's cooperative windtunnel to include transonic and sonic speeds.

JOGGLE DIES made of Boeing's plastic compound are shown by engineer Kenneth Dunn (right) and tool maker Kenneth Jones, who helped devise method of forming dies.

Plastic Cuts Die Forming Time

Substantial production savings are resulting from use of a new plastic compound developed at Boeing Airplane Co.'s Seattle plant. The material, particularly useful in the construction of joggle dies, takes the name Dunnlew from two Boeing production men who compounded it—tool engineer Kenneth Dunn and plastic tooling foreman Jack Lewis.

► **Die Time, Forming**—Compared to an average time of 250 hr. to fabricate a production die from steel, two dies made from the new plastic required 80 and 86 hr., respectively. Also, the plastic may be worked more rapidly than steel, by filing.

Joggle dies made of the plastic will form $\frac{3}{8}$-in. aluminum in a 90-ton press, it is reported.

► **Characteristics**—The new material, which has a base of Epoxy resin, is said to bond to metal, wood, glass, Fiberglas and many other materials without pressure or heat. The liquid plastic hardens in about 8 hr. and reaches full strength

What's my cruising range?*

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Air transportation is efficient:

The energy in a single gallon of aviation fuel will move a one-ounce letter 350,000 miles by air, based upon the performance of a typical mail-carrying transport.

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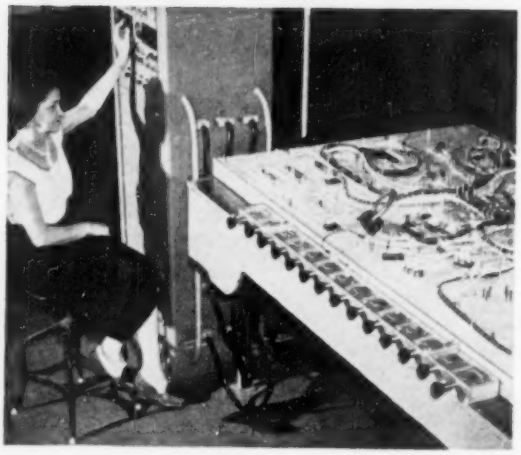
DEFENSE PRODUCTS *of High Quality at Low Cost* **DELIVERED ON TIME**

38 Hours Saved on a 40 Hour Job

Testing nearly two miles of wiring circuits in the Skysweeper Fire Control System formerly took 40 hours of a technician's costly time. Now a testing machine, operated by a trained girl, does the job in just 2 hours—20 times faster and over 2000% cheaper!

AC's Know-How has developed many such short cuts to speed production and reduce cost of complex electro-mechanical devices like the Skysweeper's Fire Control System, the A-1A Bombing Navigational Computer and "A" Series Gyro-Computing Gun-Bomb-Rocket Sights. For *dependable defense production—on or ahead of schedule —at assembly line savings*—the record proves you can always count on AC!



GM GENERAL MOTORS GM GOOD MANAGEMENT

AC KNOW HOW

In February, 1953—only 18 months after orders were placed—AC delivered their first production T-38 Fire Control System for the Skysweeper.

AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION

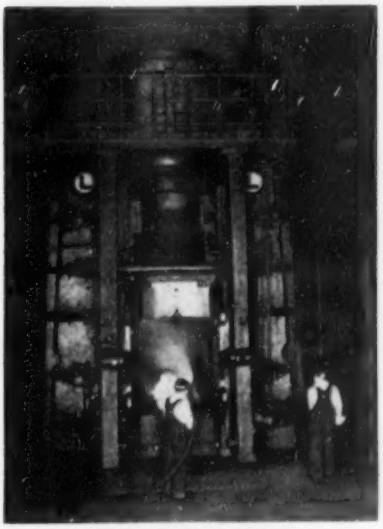
NEW PLASTIC is used to revise drill jig.

in 48 hr. at normal room temperature or more rapidly at higher temperature.

It has a compression strength without yield of 36,000 psi., while shear strength in a simple contact bond is 3,750 psi., it is reported. Hardness and strength are retained at temperatures from below zero to above 100F. The formula may be varied to gain hardness, shear strength and other characteristics.

► **Other Uses**—In addition to its use in joggle dies, Boeing is using the material to set drill bushings. In altering a Fiberglas drill jig to meet engineering changes, the old bushings are drilled out, leaving oversize holes. New bushings are placed on pins in the metal part, the drill jig placed over it in the required position, and the plastic poured around the bushing. When the material hardens, the drill jig is lifted off and ready for use.

The plastic also is being used to set template headers, make apply-trim templates, and cast master gages.



TITANIUM DROP

Huge titanium alloy propeller blade—100 in. long—is forged on giant closed-die hammer at Ladish Co., Cudahy, Wis. Intended for special Air Force research project, prop was designed by United Aircraft Corp.'s Hamilton Standard division. Material is Titanium Metals Corp.'s Ti-140-A.

SAE Forum Stresses Production Economy

Los Angeles—Annual aircraft production forum of the Society of Automotive Engineers opened at the Hotel Statler, with discussion devoted to obtaining greater air power per tax dollar.

U.S. and foreign engineers gathered for roundtable and panel talks on such topics as quality control, plant layout, procurement, tooling, materials handling and manufacturing costs in aircraft production.

Forum preceded formal sessions of SAE's five-day National Aeronautic meeting.

Technical papers submitted at these sessions took up basic design, production and operation of aircraft flying faster than sound at 70,000 ft. and operating in extremes of heat and cold.

A classified session discussed new developments in carrier landing techniques.

Bell 47-G

McCulloch MC-4

Sikorsky S-52

Hiller 360

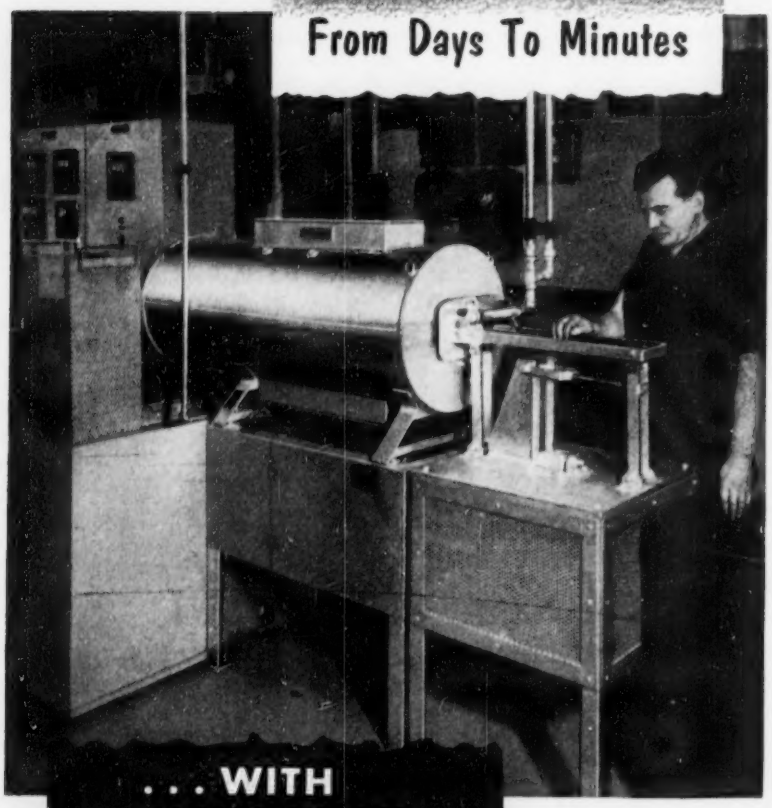
4 out of 5

CAA- Certificated Helicopters under 400 h.p. have

Franklin POWER

AIRCOOLED MOTORS, INC. SYRACUSE, N. Y.

Hardening Time Cut
From Days To Minutes



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Master Lock Company

SPEEDS PRODUCTION WITH THIS NEW FURNACE

Heat treating of an 80 pound batch of small springs required two days when hardening in charcoal filled containers. This process was not only slow but also costly due to a high percentage of rejects.

Now in a Hevi Duty Shaker Hearth Furnace, a similar batch is "bright" hardened in 75 minutes. Each spring receives uniform heat treatment without distortion thus cutting production costs. This furnace has been designed to solve your problem of heat treating small parts.

HEVI DUTY®

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WRITE FOR BULLETIN HD-850.

HEVI DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN
Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers *Constant Current Regulators*

Canadair Installs Noise Silencers

Five noise-abatement units are being installed at Canadair, Ltd., Montreal. One of the installations is for testing turbojet engines before they are hooked to airframes. The remaining noise-killing facilities—estimated to give an intensity drop of 55 db.—will handle engine tests with the powerplant installed in the plane.

Overall cost is figured at $\frac{1}{2}$-million. The facilities should be complete by the end of the year.

Canadair is producing two jet aircraft under license—the F-86 Sabre with Avro Canada's Orenda powerplant and the T-33 two-seat trainer powered by a Rolls-Royce Nene.

Because of the difference in height between the tailcones of the two aircraft, Canadair engineers designed a ramp for the T-33 so it is at the same height as the Sabre.

New Forging Die Facilities

A new die shop has been completed by Consolidated Industries, Inc., West Cheshire, Conn., to complement the aircraft field's requirements for aluminum, steel and titanium forgings.

Devoted entirely to special die pro-

POLISHING GUN

A simple finishing scheme at Consolidated Vultee Aircraft Corp.'s San Diego division is cutting production costs by more than $4,500 annually. A small, circular piece of emery paper is held against the metal part by the rotary motion of a cylindrical section of rubber at the end of the air tool shaft. Finishing formerly was done by hand-polishing small parts with emery paper over a wood block. New scheme not only saves 3,000 hr. annually, but gives higher quality finish, makes it easier to get at hard-to-reach spots, Convair says.

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...for its history making, new DC-7's!

American's new DC-7 Flagship cruises at 365 miles an hour. Her top speed is 410.

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• BALANCED 1-LB. WEIGHT
SAVES YOU 8 times its cost during one engine assembly

3 TOOLS-IN-1

PLIERS CUTTERS TWISTERS

- 12" size—for assembly line production. $19.50 ea. —$18.50 ea. in dozens
- 9" size—for bench work on magnetos, carburetors, instruments, controls, etc. $18.50 ea. $17.50 ea. in dozens.
- FOB, SACRAMENTO, CALIFORNIA

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"It's the most valuable small tool we have on our production line."

"I am very enthused about this tool. I feel it will save thousands of man-hours throughout the Air Service Command."

"Please do everything possible to rush shipment; our program is seriously retarded without these pliers."

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If you are not completely satisfied with the Robinson Wire Twister, we will replace it or refund the entire price. No one is perfect, of course, and we have replaced a few, but once the tool has been used, it has proven so valuable that we have yet to be asked for a refund.

MAIL THIS COUPON

for further information or to place your trial order. If, after using this tool, you feel that you can afford to do without it, just send it back. Fill in the coupon right now—start saving the money you are losing on inefficient hand-twisting methods.

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You can safety wire three engines with ROBINSON WIRE TWISTERS in the time you now take for one

Reports from a large air force maintenance base show that average assembly line workers can safely wire three engines with the Robinson Wire Twister in the time required to do one by any other method. This means a conservative saving in labor costs of $140 (enough to pay for eight Twisters) per engine assembled. Small outfits, too, including sub-assembly plants, flying services, research, repair, and overhaul organizations, have found this tool more than profitable. You have to see the Robinson Wire Twister in action to realize the speed with which it completes a perfect, uniform twist every time. In addition, it completely eliminates time wasted in switching from one tool to another because it is pliers, cutters, and twisters all in one precision quality tool. It's easy and natural to use and permits corresponding savings in time and costs on *any wire twisting job.*

HERE'S A FEW OF THE FIRMS NOW SAVING MONEY WITH THE R. W. T.

Allison	American Airlines
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Dyersburg Flying Service	Middle East Airlines
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☐ Please send .... 12" and/or .... 9" Twisters. We'll return them or send check within two weeks.

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Address .....

City ..... State .....

Name ..... Position .....

duction, the shop will encompass 4,100 sq. ft. of floor area. Initial equipment comprises 11 Pratt & Whitney plain and universal die sinker units.

New, automatically controlled equipment is scheduled to be added to the shop in the near future, according to Consolidated.

OPERATOR listens in to sound of metal removal as he holds close tolerances.

Finishers 'Tune In' On Burnishing

Burnishing operations at Minneapolis-Honeywell Regulator Co.'s aeronautical manufacturing plant now "broadcast" their own tolerance-limitation signals to the finisher to reduce the number of rejected parts.

M-H's methods engineer Ted Minor has come up with the idea of using a microphone, amplifier and earphone (or speaker) arrangement for transmitting sound from the burnishing wheel to guide the operator in holding extremely close tolerances. Minor's theory is that the volume of sound in such finishing operations is in direct proportion to the amount of metal that is being removed by the tool.

The system has been installed on two burnishing machines and has reduced scrap losses by minimizing "over-shooting" of the tolerance point (in the M-H operation it takes only 1/50 the thickness of a human hair to make the difference between a good part and a reject).

Tied in with the hearing equipment is a dimension-checking electronic comparator accurate to 5-millionths of an inch.

Formerly, operators had a tendency to lean over the machines to "hear" how much metal was being removed in the burnishing job.

Now the operator can monitor the job sitting in a normal position, thus reducing fatigue.

KEARFOTT GYROS

KEARFOTT vertical gyros providing continuous vertical reference within two minutes of arc under bench conditions typify the engineering know-how and production skills available to you in the field of precision gyros for airborn control applications.

Designed for particular applications with stringent performance requirements, a wide variety of free, vertical and rate gyros now in production are being used extensively in aircraft and missile control systems demanding the most precise gyro reference obtainable.

Kearfott gyros incorporate many unique features permitting operation under extreme operational or environmental conditions. A true hermetic seal in dry inert gas provides positive environmental protection. Synchro pick-offs and rigid structural elements assure performance during adverse conditions of vibration or shock.

If you require gyros with these highly desirable characteristics, we would be happy to review your application to the end that these problems may be resolved. Please write today for Bulletin #53 describing our products and facilities. Technical data on all products is available and will be sent on request.

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Gyros, Servo Motors, Synchros, Servo and Magnetic Amplifiers, Tachometer Generators, Hermetic Rotary Seals, Aircraft Navigational Systems, and other high accuracy mechanical, electrical and electronic components.

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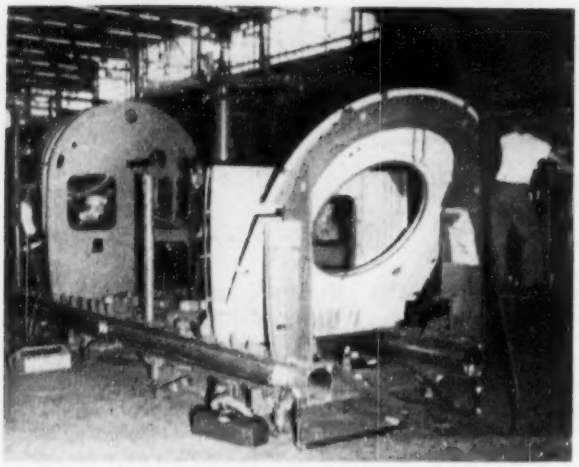
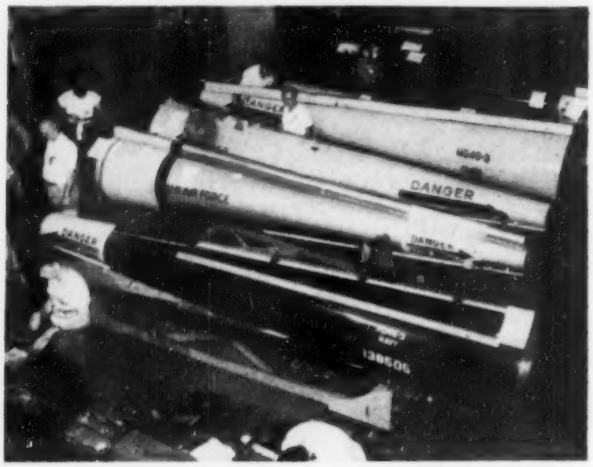
A General Precision Equipment Corporation Subsidiary

Military S-55 Copters Roll Down Line At Sikorsky

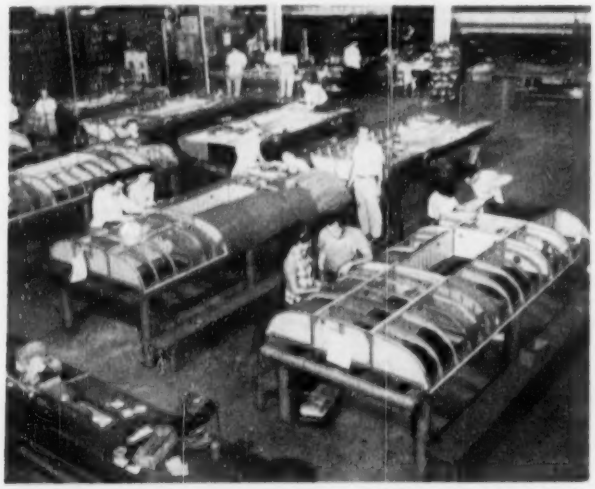
SIX OF A KIND Flight of HRS helicopters, Marine Corps version of Sikorsky's S-55, lines up after takeoff from aircraft carrier.



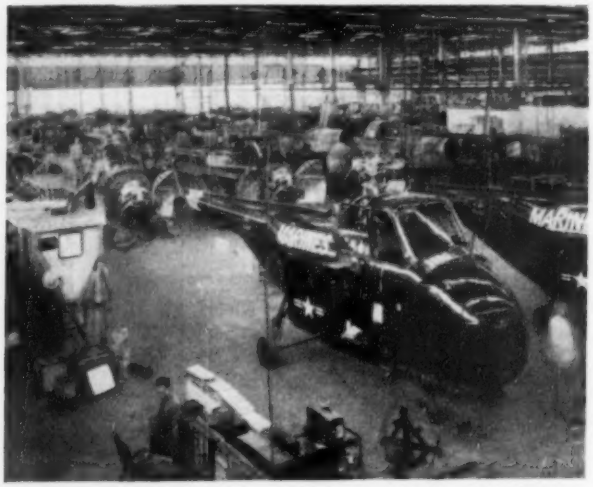
MAIN CABIN JIG with large fore and aft bulkheads in place. Slant bulkhead backs up the seven-cylinder Wright R1300 engine, which is installed at an angle in copter's clamshell nose section.



TAIL BOOM assembly area at Sikorsky brings together H-19Bs and HO4S-3s, USAF and Navy versions of the S-55. Top of boom carries series of U-fittings and a tunnel fairing for anti-torque rotor driveshaft.

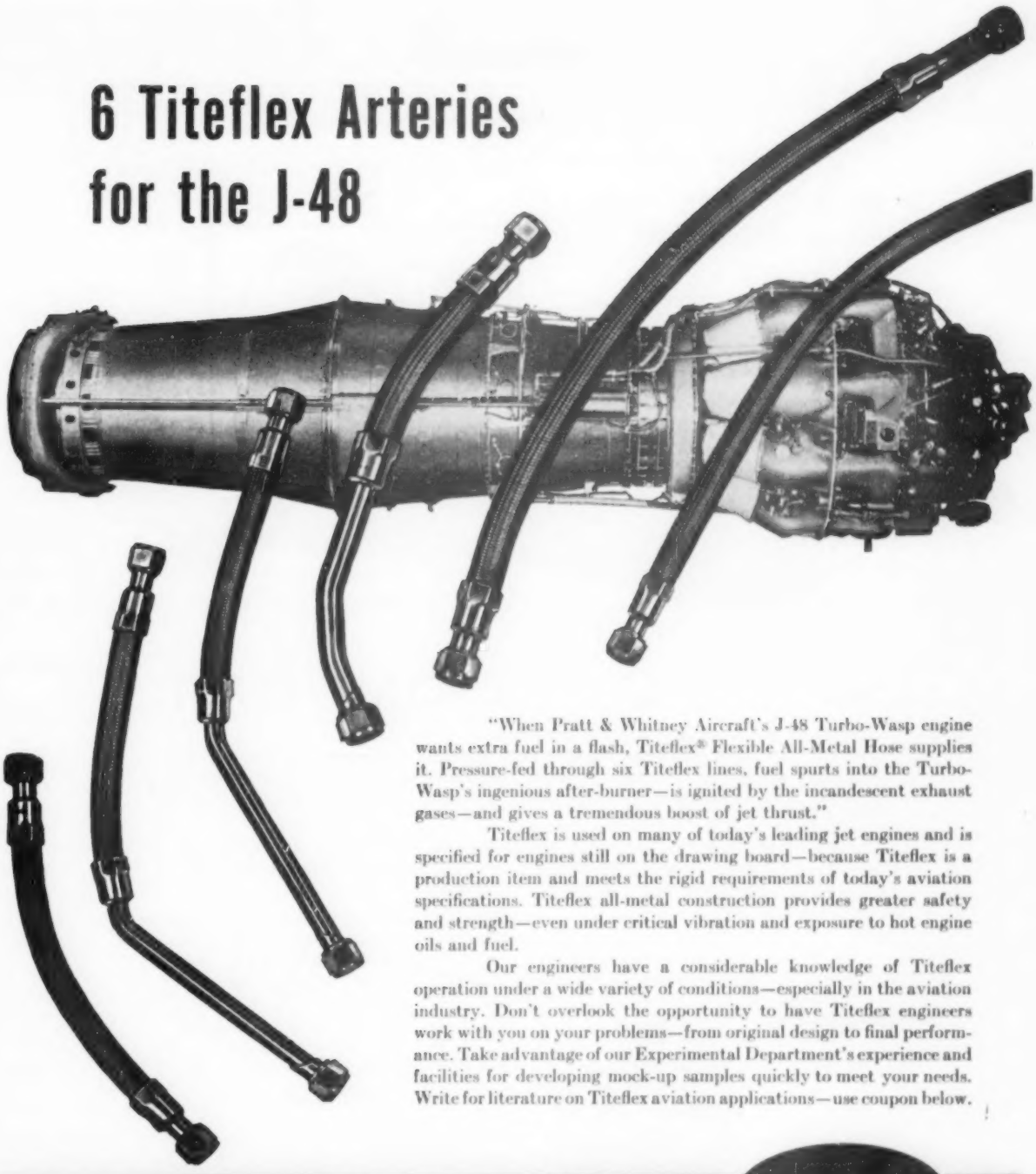


CABIN UNDERBODY assembly shows deep longitudinal beams and series of main frames with shallower units between. Unobstructed bay in center of structure will accommodate gas tank.



FINISHING TOUCHES will take this Marine HRS-3 off the final assembly line. Air Force H-19Bs fill the rear of the assembly area. The S-55 is designed to carry 10-12 passengers.

6 Titeflex Arteries for the J-48



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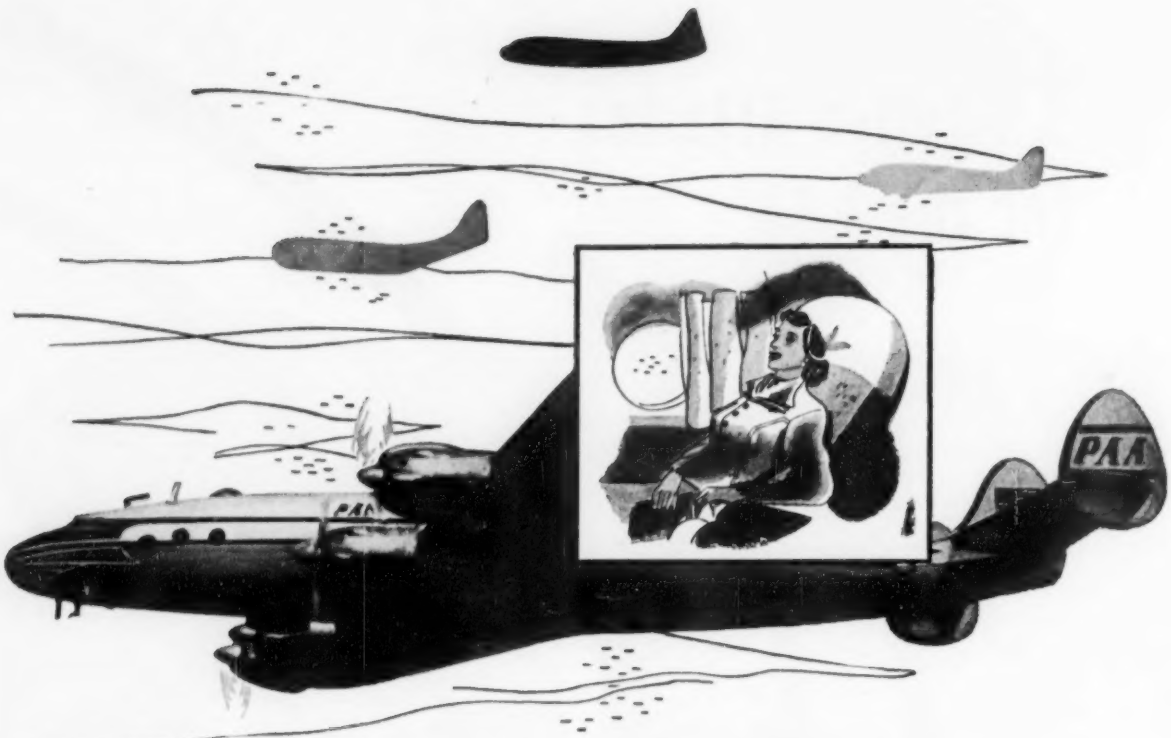

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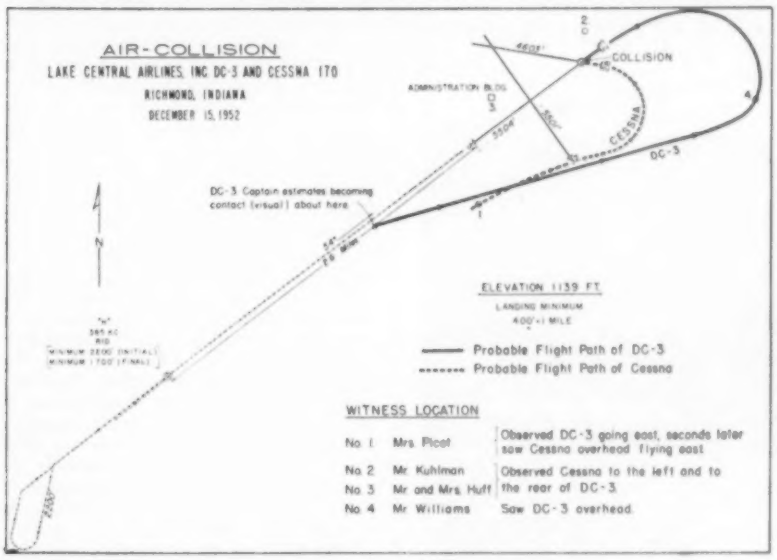
AIR-COLLISION
LAKE CENTRAL AIRLINES, INC DC-3 AND CESSNA 170
RICHMOND, INDIANA
DECEMBER 15, 1952
COLLISION
ADMINISTRATION BLDG
CESSNA
DC-3
DC-3 Captain estimates becoming contact (visual) about here
ELEVATION 1139 FT.
LANDING MINIMUM
400'-1 MILE
Probable Flight Path of DC-3
Probable Flight Path of Cessna
WITNESS LOCATION
No. 1 Mrs. Picot — Observed DC-3 going east, seconds later saw Cessna overhead flying east
No. 2 Mr. Kuhlman — Observed Cessna to the left and to
No. 3 Mr and Mrs. Huff — the rear of DC-3
No. 4 Mr. Williams — Saw DC-3 overhead

CAB Accident Investigation Report

Cessna, DC-3 Collide in Approach

Icing conditions that reduced cockpit visibility and an inadequately monitored approach at an uncontrolled airport were strong contributing factors in the collision between a Lake Central Airlines' DC-3 and a Cessna 170 at Richmond Municipal Airport, Ind. The Cessna pilot was killed. Here is CAB's complete report:

THE ACCIDENT

An air collision occurred between a Lake Central Airlines' DC-3 aircraft, N 21716 and a Cessna 170 aircraft, N 3131B, at 0952[1], Dec. 15, 1952, at the Richmond Municipal Airport, Richmond, Ind., when these aircraft were landing on intersecting runways. The pilot, the only occupant of the Cessna, was killed and that aircraft was demolished. None of the nine occupants of the DC-3 were injured and that aircraft received only minor damage.

HISTORY OF FLIGHTS

Lake Central Airlines' Flight 21 of Dec. 15, 1952, originated at Grand Rapids, Mich., with its destination Cincinnati, Ohio, and with scheduled intermediate stops among which were Indianapolis, Ind., and Richmond, Ind. At Indianapolis, routine aircraft and crew changes were made. The new crew consisted of Capt. Valentine Prose, First Officer Neal Payton and Stewardess June Silverthorn. Thomas Cotter, employed by the company as a relief dispatcher and occupying the jump seat, was listed as the fourth member of the crew.

The following weather information was available to the crew at the time of departure from Indianapolis: Richmond at 0820 —ceiling estimated 600 feet overcast, light snow showers and fog, visibility 5 miles, temperature 23 degrees and wind from the southwest at 16 miles per hour; Indianapolis at 0828—scattered clouds at 1,100 feet, ceiling measured 2,500 feet overcast, visibility 10 miles and wind from the west at 12 miles per hour. The regional forecast for the period involved in this flight indicated that light to moderate rime and clear ice would be encountered in the clouds over Illinois, Indiana, and Ohio with freezing drizzle in the extreme northeast portion of Indiana.

Flight 21 departed Indianapolis at 0918 and was cleared in accordance with Instrument Flight Rules (IFR) direct to Richmond at a cruising altitude of 2,300 feet. There were five passengers. The gross weight of the aircraft was 23,017 pounds, which was within the allowable certificated limit and the load was properly distributed with respect to the center of gravity of the aircraft.

At 0927—nine minutes after taffeoff—the flight requested a change in cruising altitude from 2,300 feet to 3,000 feet. This was approved by ARTC (Air Route Traffic Control) and the flight climbed to the new altitude. At the 3,000-ft. level the aircraft was between two layers of clouds; however, a short time later the cloud layers merged and flight was continued on instruments.

At 0940 the flight advised the company at Richmond that it was in range and requested the local weather which was given as: Ceiling estimated 500 feet overcast, light snow showers, fog, visibility 5 miles and wind from the southwest at 18 miles per hour. Flight 21 reported over the Richmond "MH" marker (a non-directional hom-

[1]All times referred to herein are Central Standard and based on the 24-hour clock.

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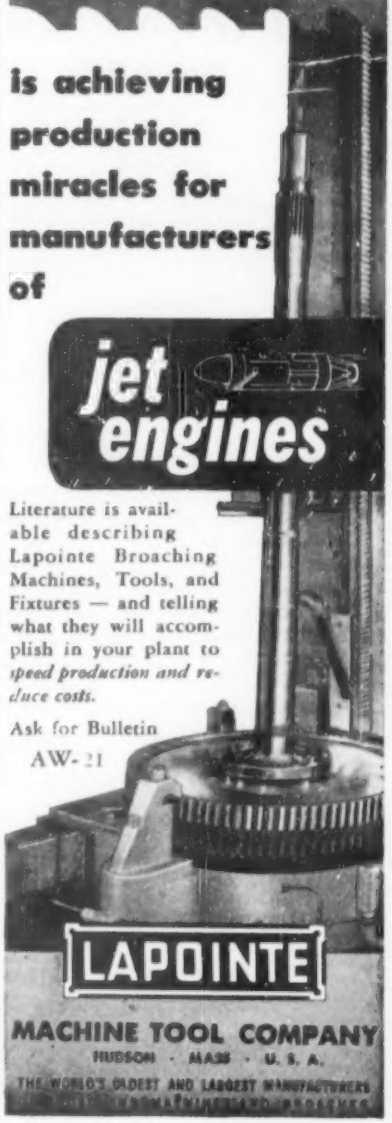

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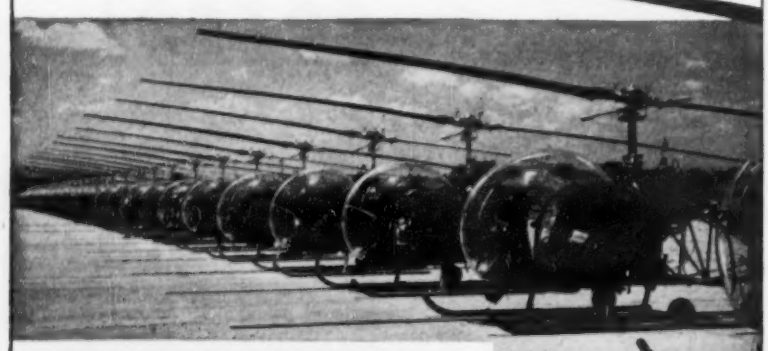

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on the upper engine basket

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ing beacon) at 0944 and proceeded outbound on a heading of 234 degrees. A standard D/F approach was immediately begun.[3] A few minutes prior to and during the approach the aircraft began picking up ice; accordingly the propeller and windshield de-icers and the windshield wipers were turned on. A normal approach was made and the aircraft became visually contact approximately one mile southwest of the airport at an altitude of about 400 feet above the ground.[4]

The company's agent, who from the ground was monitoring the approach,[5] advised the flight that he had it in sight and that there was no other traffic.

Because the tetrahedron showed the wind to be from the southwest and nearly aligned with Runway 23, the captain made a right and then a left turn to make a close-in approach to this runway. When starting flare-out for the landing a few feet above the ground the company's relief dispatcher seated on the jump seat (between and to the rear of the two pilots' seats) momentarily observed an aircraft approaching from the left. He immediately shouted to the captain to look out. Power was applied at once, but almost instantly thereafter the two aircraft collided.

The DC-3 yawed to the right and for a few seconds was difficult to control; however, the right main landing gear wheel made contact with Runway 23 some distance from the collision point and the aircraft rolled off the runway onto the grass. After rolling approximately 800 feet the captain was able to return the aircraft to the runway and stop. All occupants immediately deplaned; there was no fire.

On Dec. 14, 1952, Mr. Sherman S. Graves, manager of the Helicopter Div., Cessna Aircraft Co., departed Wichita, Kan., for Dayton, Ohio, in a Cessna 170 aircraft, N 3131B. Although no flight plan was filed it is known that sometime that day Mr. Graves stopped at Alton, Ill., where the aircraft was refueled. The flight was delayed at this point for a few hours because of unfavorable weather conditions; however, later in the afternoon, flight was continued to Effingham, Ill., where an overnight stop was made.

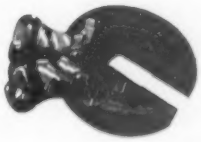
The following morning, Dec. 15, the Cessna pilot departed Effingham, again without filing a flight plan,[6] and at 0729, when five miles east of Effingham, called the Vandalia, Ill., communications station requesting the Indianapolis and Dayton weather. The 0628 weather sequence was given as follows: Indianapolis—ceiling measured 1,100 feet broken, 2,000 overcast, visibility 7 miles, temperature 24, dew point 20, wind west 16 miles per hour; Dayton—ceiling measured 1,000 overcast, visibility 10 miles, temperature 22, dew point 19, wind west-southwest 15 miles

[3]Special authorization from the Administrator of Civil Aeronautics is required for anyone to use an "MH" facility as a means of making an instrument approach to an uncontrolled airport if the instrument approach procedure is not published in the Flight Information Manual. Lake Central Airlines was the only party authorized to make such an approach at Richmond, Ind.

[4]The company's minimums at Richmond are: ceiling 400 feet and one mile visibility.

[5]The Richmond Municipal Airport does not have a control tower.

[6]Filing a flight plan was optional.



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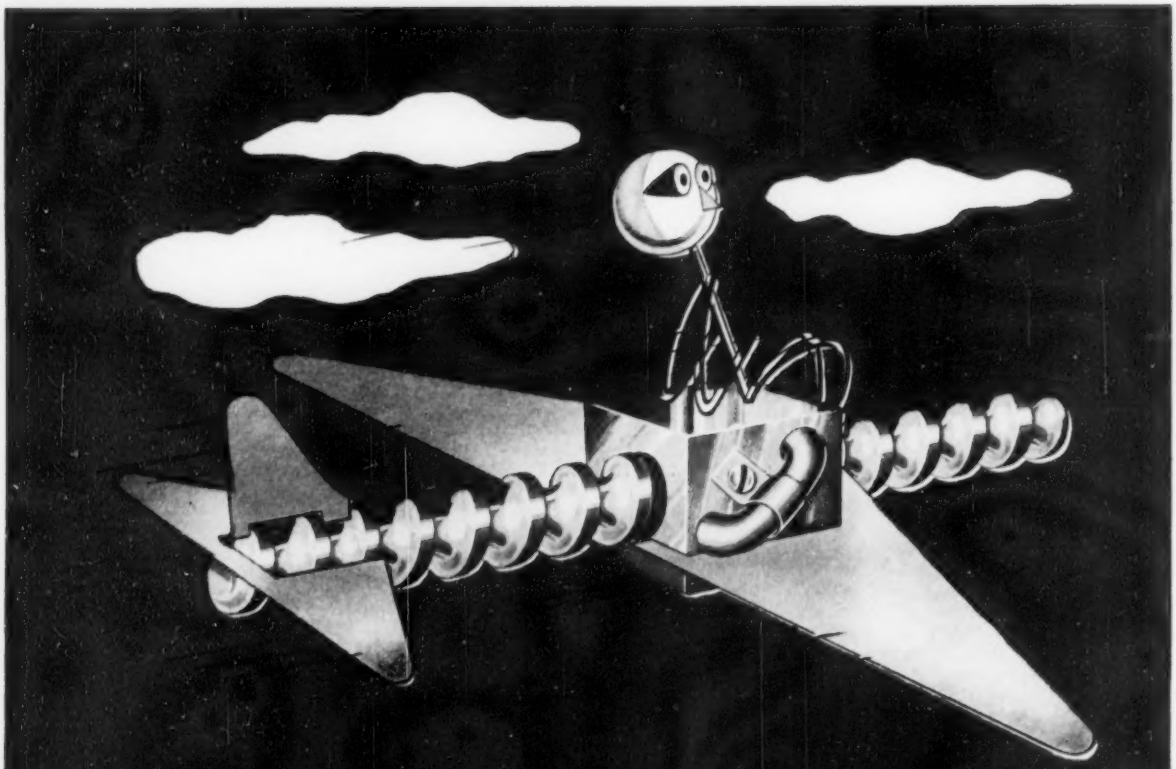

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per hour. Mr. Graves was also told at this time that a later sequence report would be available to him in six or seven minutes. This was the last known contact with the Cessna pilot.

At approximately 0951, the Cessna was observed approaching the airport close-in and from a southwesterly direction at an altitude between 300 and 400 feet and then to turn left for a landing on Runway 28. A few seconds later, at the intersections of this runway and Runway 23 the Cessna and the DC-3 collided. The pilot and sole occupant of the Cessna was killed and that aircraft was demolished by impact and fire.

INVESTIGATION

Examination of Runways 23 and 28 revealed a seven-foot-long left-curving scar made by the propeller of the Cessna on Runway 23. This mark was located 45 feet southwest of the intersection of the runways. The Cessna came to rest in an inverted position on Runway 23, a distance of 245 feet from this propeller mark. On the right side of the runway near where the Cessna stopped, a tire mark was found which was identified as being made by the right landing wheel of the DC-3. No other marks on the runways could be identified as having been caused by these aircraft.

The main portions of the Cessna wreckage were lying close together on the runway. The fuselage lay in an inverted position and was badly damaged by impact and fire. The right wing, which was destroyed at first impact by the right propeller and landing gear of the DC-3, was severed from the fuselage and demolished. The empennage was in an upright position and had been severed from the fuselage by the right propeller and right landing gear of the DC-3, approximately two feet forward of the horizontal stabilizer. The left wing, although damaged to some extent, was intact and attached to the fuselage. A section of the Plexiglas windshield was found on the runway with a formation of ice on its outer surface.

The DC-3 suffered only minor damage, most of which was in the nature of nicks and slight abrasions to its propeller blades. There were a few scratches on the right landing gear strut. The left side of the right tire was scuffed and there were a few shallow cuts both on this side of the tire and on the tread. A shallow formation of ice was found on the leading edges of both wings and the horizontal stabilizer.

Examination of the wreckage of the Cessna and the marks on the DC-3 disclosed that at the time of the impact the aircraft were on courses converging at an angle of about 50 degrees with the Cessna to the left of the DC-3. (Runways 23 and 28 intersect at an angle of 50 degrees.)

There was no evidence that either aircraft was malfunctioning prior to the accident.

On the morning of Dec. 15, 1952, there was a low pressure center southeast of James Bay, Canada, with a weak trough extending southeastward across Michigan, Indiana, and into southwest Kentucky. This trough was accompanied by low ceilings and light precipitation (ranging from snow showers to freezing drizzle) in eastern Indiana and Ohio. By 0630, precipitation had stopped in western Indiana, ceilings had improved and it was clearing in Illinois. There were no fronts in the area and the low clouds and precipitation were caused by very weak wind convergence plus a gradual up slope wind. The entire system was moving eastward.

Freezing drizzle was not reported by the weather observer at Richmond and, therefore, no broadcasts of freezing drizzle for that station were made. However, the weather forecaster at Indianapolis stated that pilots who were briefed at the Weather Bureau Office on the morning of Dec. 15, were cautioned against flying eastward in an aircraft not having de-icing equipment. At 0920 a weather report was made at Richmond which contained light drizzle and a surface temperature of 24 degrees. With that temperature, it is obvious that "freezing drizzle" should have been reported instead of "drizzle." Icing conditions below the cloud ceiling would have been encountered at a point about 25 miles west of Richmond. Ground witnesses in the vicinity of Richmond reported that at about the time of the accident automobile windshields were accumulating moderate to heavy ice.

As far as is known, Pilot Graves made no request for weather information other than that which was given him shortly after departing from Effingham. However, weather information was available to this pilot through scheduled broadcasts transmitted every 15 and 45 minutes after the hour although none of these broadcasts indicated freezing drizzle in the Richmond area.

Lake Central Airlines' station agents at Richmond are accredited U. S. Weather

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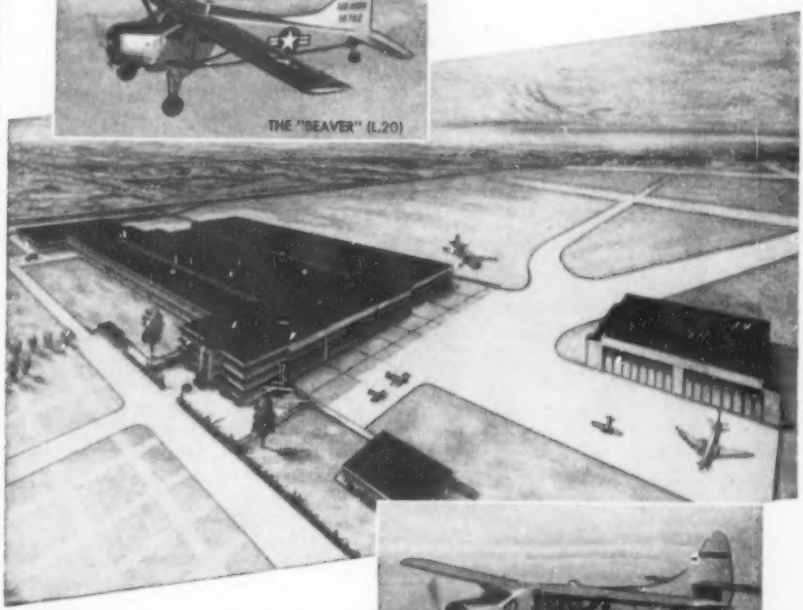

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Bureau observers and as such make weather observations. These are transmitted at irregular periods to the Indianapolis weather office.

The DC-3 crew testified that during the approach to the airport it was necessary to use windshield wipers, windshield de-icers and propeller de-icers and that after contact was established windshield de-icing fluid was turned off. However, a rapid accumulation of ice on the windshields made it necessary to immediately turn the de-icing fluid on again. They said also that the rear one-third of the cockpit side windows were covered with a heavy frost and this together with alcohol swirls obscured their vision approximately 25%. Both pilots said that throughout the entire approach they were on the alert for other aircraft.

The Richmond Municipal Airport has three hard-surfaced runways varying in length from 4,600 to 5,500 feet. The distance from the approach end of Runways 23 and 28 to their intersection is approximately 750 feet. Lake Central Airlines' office is in the Administration Building which is located on the west side of the airport and faces in an easterly direction. A view from the window of this office encompasses the approach end of Runways 23 and 28.

The Richmond station agent stated that he was the only company employe on duty at the time Flight 21 was making its approach, and that after talking to the flight during the initial stages of its approach he went outside and stood on the ramp approximately 15 to 20 feet in front and to the side of the Administration Building. From this vantage point, he watched the DC-3 break through the clouds and proceed in a generally easterly direction. He then returned to the office and told the flight it was in sight and that there was no other traffic. Following this conversation he again returned to the ramp and observed that the DC-3 was then on the downwind leg of the traffic pattern and no other traffic being in sight, he returned to the office to perform other duties. A short time later he glanced through the office window and saw the DC-3 over Runway 23, between the boundary of the airport and the intersection of the runways. Suddenly he saw the Cessna about to land on Runway 28. He reached for the microphone to advise Flight 21 of the presence of the small aircraft. However, collision occurred before the message could be transmitted.

According to the company's Operations Manual, the agent is instructed to use a 60-ft. microphone extension located on the outside of the building during the monitoring of the flight in the local area.[6] This was not done.[7] [*Footnotes on p. 50.*]

A number of ground witnesses at or near the airport stated that they saw the DC-3 approaching the airport at a low altitude from the southwest. A short time later they observed the Cessna approaching approximately from the same direction and at about the same altitude or possibly lower.

Two passengers on board the DC-3, who were seated on the left side, stated that when the aircraft was near the approach end of Runway 23 they saw the Cessna at a lower altitude turning left to land on Runway 28.

Mr. Graves, the Cessna pilot, had been employed by the Cessna Aircraft Co. since

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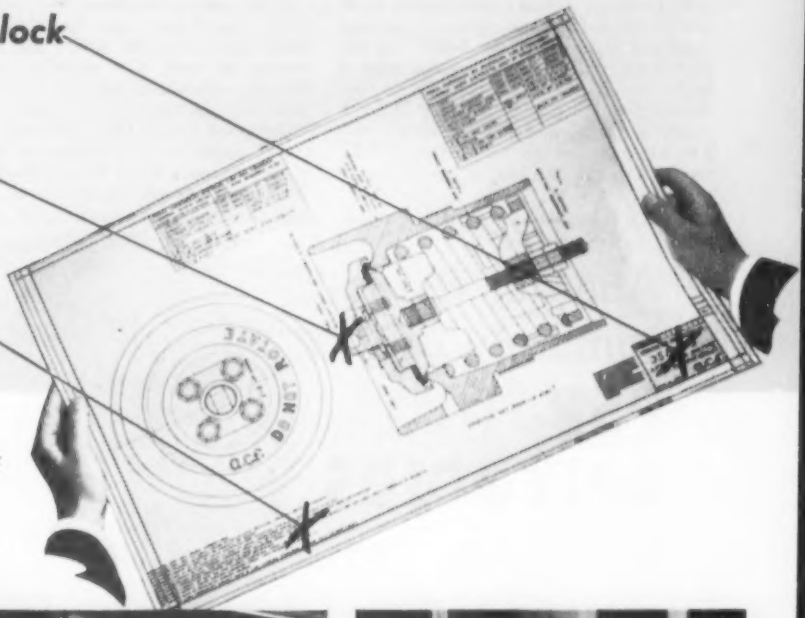

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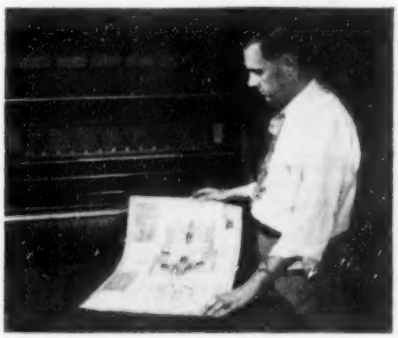

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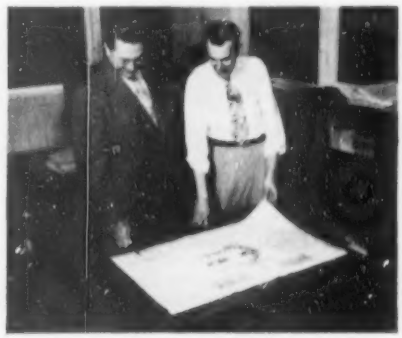

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1936. He held an airman certificate with a private pilot rating and an aircraft and engine mechanic certificate. At the time of the accident he had accumulated approximately 939 flying hours and a large portion of this experience had been in cross-country flying.

The Cessna N 3131B, was a four-place, single-engine, high-wing monoplane type aircraft with a normal cruising speed of 120 miles per hour. It had a fuel capacity of 42 gallons with a fuel consumption of between eight and nine gallons per hour. The aircraft was a 1953 model and had a total of approximately 43 flying hours. It was equipped with a cabin heater with a windshield defrosting (not de-icing) attachment. The radio equipment consisted of a VHF transmitter and receiver, a low-frequency receiver and omni.

ANALYSIS

The evidence indicates that when the two aircraft approached the airport the Cessna was behind the DC-3 and possibly slightly lower. The distance between the aircraft (not accurately known) and the shorter radius of turn to Runway 28 made by the Cessna brought them together at the intersection of Runways 23 and 28.

Under normal conditions the pilot of the Cessna should have seen the other aircraft when approaching the airport and prior to turning on final. It is probable, however, that his windshield was partially covered with ice, impairing forward vision. Several things point toward this conclusion. There is a discrepancy of 40 minutes in the time of the Cessna's flight from Effingham to Richmond. It took two hours and 23 minutes to fly a distance of 203 miles which at normal cruising speed (120 miles per hour) should have been flown in one hour and 43 minutes, with zero wind or even less with the prevailing quartering tail wind. Where the pilot was during that time is not known, but it is possible that he was in the icing area for a considerable time. Also, Runway 28 was chosen by the Cessna pilot for his landing despite the fact that the tetrahedron clearly indicated that a landing on Runway 23 would be into the 18-miles-per-hour wind. If ice did obscure his forward vision appreciably the pilot would look through his left side window most of the time and therefore might not see the DC-3.

What is not known is why the pilots of both aircraft did not see each other. With the Cessna to the rear of the DC-3, the crew of the latter aircraft would not be apt to see the other aircraft until their turn to final or on final approach. It is difficult to explain why the smaller aircraft was not seen by the crew of the DC-3 during this turn and on final approach except for the fact that the DC-3 pilots must, at that time, have been concentrating exclusively on the imminent landing.

The fact that they had been advised by the station agent that there was no other traffic, together with the fact that with such a low ceiling traffic would not normally be expected, may have created a sense of false security. This may have contributed to some extent; however, there were three persons in the DC-3 cockpit and all said they did not see the approaching Cessna aircraft until it was too late to avoid the collision. The rear one-third portion of the side cockpit windows being opaque from frost or ice did not prevent the pilots from having complete coverage of their normal field of vision during the final approach.

The instructions to the station agent per-

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[4]Operations Manual—Lake Central Airlines . . . Part 4.520=B. **When Approaching Station on Instruments (RID and OKK)** . . . "2. Approximately 10 minutes before estimated time of approach over a station not having a range or tower facility, the Captain shall contact the LCA ground station giving his ETA over the station in a manner similar to that in the above procedure; however, advising also the trip's intention to make an approach to the field. NO APPROACH WILL BE INITIATED OR EFFECTED UNLESS TWO-WAY RADIO CONTACT IS ESTABLISHED PRIOR TO APPROACH, AND SUCH APPROACH WILL BE DISCONTINUED SHOULD SUCH TWO-WAY CONTACT BE LOST.

3. Upon receipt of the information that the flight anticipates instrument approach, the ground agent will utilize the outside microphone extension made available for this use, and place himself in a position to view the approach from the let-down facility and notify the flight that his path from the facility to the field appears to be clear for the approach. Should conditions arise that make the let-down hazardous in the estimation of the ground agent, the flight will be immediately contacted, and the approach abandoned."

[5]CORRECTIVE ACTION: As a result of this accident Lake Central Airlines is now instructing its personnel at uncontrolled airports to monitor all instrument approaches from the time the aircraft first approaches the facility until it is actually on the ground. VFR flights are to be monitored in a similar manner if the prevailing visibility is 5 miles or less. In order that the agent may make no error as to his position during the monitoring of flights, microphones have been placed at locations where the entire horizon is visible.

taining to the ground monitoring of an approach to the Richmond Airport, as set forth in the company's operations manual, are there solely in the interest of safety and to cover situations such as existed this day. The fact that these instructions were not strictly adhered to in that the agent did not properly scan the entire area and did not use the outside extension cord and microphone and therefore did not contact the aircraft from outside the Administration Building may have contributed to his non-observance of another aircraft in the immediate area. Since the collision occurred at the intersection of runways converging at 50 degrees and since ground witnesses observed the Cessna closely following the DC-3 when these aircraft were approaching the airport, it is evident that at the time the agent monitored his flight, the Cessna must have been close by and should have been visible to him.

As a result of this accident, the Civil Aeronautics Board and the Civil Aeronautics Administration are making a study of both IFR/VFR traffic conditions at uncontrolled airports so that corrective action can be taken to better control such traffic.

FINDINGS

1. The carrier, both aircraft and the three pilots were properly certificated.
2. Both aircraft were in an airworthy condition prior to the collision.
3. When both aircraft approached the airport the cloud ceiling was estimated to be 500 feet, visibility 5 miles, and icing conditions existed both in and below the clouds.
4. During the approach to the airport and prior to final approach to the runways the Cessna was to the rear of the DC-3 and therefore in a better position to see the DC-3.
5. The relative positions of the two aircraft on final approach were such that each could have been seen from the other.
6. The DC-3 was landing in to the wind on Runway 23.
7. The Cessna cut in and landed on Runway 28 which intersects Runway 23 at a 50-degree angle.
8. Windshield ice may have prevented the Cessna's pilot from seeing the DC-3.
9. The company agent did not adequately scan the area during the approach of the DC-3 as prescribed in the company's operations manual.
10. The aircraft converged at an angle of approximately 50 degrees, and collided a few feet above the airport.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the failure of the pilots of both aircraft to observe and avoid each other. The action of the Cessna pilot in cutting in and attempting to land contrary to the prevailing wind direction, and the inadequate monitoring of the DC-3's flight from the ground contributed to the accident.

BY THE CAB:

/s/ Oswald Ryan
/s/ Harmar D. Denny
/s/ Josh Lee
/s/ Joseph P. Adams
/s/ Chan Gurney

(Advertisement)

Whittaker has made mistakes, of course. What company hasn't?

When they happen Whittaker does more than blush. The flubs are acknowledged . . . then rectified.

For that reason a direct-to-the-point letter was mailed recently to the general purchasing agents of the major airframe companies. It read in part:

"The William R. Whittaker Co., Ltd., would like your assistance in offering suggestions as to how we can improve our service . . . Please feel free to offer any constructive criticism . . . It will be taken into consideration in establishing the future policies of this company . . ."

This, if I ever read one, is a sincere request by a company that recognizes the importance of service and admits that the functions of any concern can be improved, no matter what the score of past successes.

Like most other manufacturers, Whittaker is constantly working to better its operation. The valve company realizes and frankly contends that "the man on the other end of the line may see faults we can't see."

Hence the letter asking for constructive criticism.

To cite a specific instance: Boeing, some eighteen months ago, criticized Whittaker for its method of quoting deliveries. Deadline dates appeared realistic at the time they were quoted, but somehow they weren't panning out as promised.

Boeing brought the matter up in a constructive way and Whittaker agreed one hundred percent.

Conferences were held with various department heads — engineering, production engineering, production control — evolving into a practically foolproof system of checks and re-checks to assure sound delivery quotations.

The problem was solved, but in the solution lay the roots of another headache. In time it was found that the new system delayed the return of a customer's paperwork. This, too, Boeing brought to Whittaker's attention.

Finally came the adoption of completely new procedures that assured not only realistic delivery dates, but also the prompt return of paperwork within the set limit of fourteen days, or, in special cases, extensions approved by the customer.

Every company, at inception, is eager to please, anxious to learn how it can better itself, candid in asking for criticism and suggestions. That was Whittaker at the outset. And that is Whittaker today.

Sound criticism, carefully considered, has an inevitable way of turning into better production . . . and Whittaker knows it. The customer gets the service he wants — or the valve — and Whittaker is more efficient, more successful, in the exchange.

Close kin to criticism is suggestion. In fact the two can be merged so diplomatically that one can scarcely be distinguished from the other.

Take the case in which Whittaker was working all-out to produce a certain type fail-safe valve for General Electric. Time after time prototype units failed to meet specifications. The valve company, in reaching for a solution, felt like it was groping blindly in a bag of weak links.

Then GE came up with suggestions for possible material changes and engineering remedies based on long experience. Certain test facilities also were provided for Whittaker, and the result of this "heads together" operation was a valve that met all specifications.

Whittaker deeply appreciates such cooperation, for when the going gets rough there's nothing like understanding and joint action to achieve a common goal.

Unfortunately, in every business, a great number of successes can be forgotten in one failure — momentarily at least — for the current headache is always the worst. Yet in final analysis, achievement is measured on the yardstick of consistent performance.

To maintain its performance at a constant high, Whittaker invites your help, your suggestions, your criticism.

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LETTERS

Dialogue on Statistics

I've just had a very distressing experience: a few minutes ago, a very old friend of mine burst into my office, bearing your Aug. 3 issue, his face a disgusting mask of bourgeois terror. A shaking forefinger rattled against your lead editorial, "Six Times Safer."

"You see this?" he quavered. "You realize what this means—that I'll be killed the next time I take a scheduled airline coast-to coast?"

Irrational emotional displays of this kind always irritate me: they demonstrate a regrettable lack of discipline. I summoned my patience.

"Relax, you old fool," I told him. "That's only to check if anybody reads the editorial page. And what have you to worry about, anyway? You haven't been making a transcontinental trip every week for 2,000 years." I was, of course, on firm ground here: I can both read and understand Statistics, and I know that figures don't lie. With a kind of low, animal cunning, he read my mind.

"But liars figure," he squeaked, "like the guys who told me when I started flying that it would be 500 years before I had an engine failure, if I ever did. I've had five, so that makes me 2,538 years old, weekly transcontinental trip or no weekly transcontinental trip. On top of that, I have 400,000 personal airline passenger-miles under my frayed seat belt, and 1,500 hours of my own. No fool would give me even money on a scheduled trip around the airport."

Somehow, I managed to keep my temper; I even produced a patronizing smile.

"Trouble with you is," I told him through my teeth, "you ain't an average passenger, or an average pilot. You're a menace; and if I weren't such a good friend of yours, I'd turn your name in to the Un-American Activities Committee. Maybe I will anyway.

"Besides," I went on, lighting the wrong end of my filter-tip cigaret, "the railroads evidently just had an off year of perfect safety, like Colonial keeps doing. I happen to know they've been warned. Man was born to die, and modern transportation devices help fulfill one of Nature's basic functions.

"Your tendency to want to live forever is pretty subversive, and I remember once before when you said that there might be something to this heresy of Absolute Safety; and that Aviation Week ought to make a study of it.

"You even suggested that it might be a good idea (a really offensive term, old boy) if some of the airlines had a Vice-President in charge of Safety!

"My advice to you—and I most sincerely hope you take it—is to lay off that stuff; it's Wrong Thinking. Don't try to swim upstream; learn to kick the railroads around, teach yourself to explore the Statistical World of Probable Dreams. Lucky for you there's no hidden microphone in this office, yet."

The poor wretch really is concerned, and I feel sorry for him. I took my feet down off the desk and piloted him to the door. I couldn't help feeling, as I closed it firmly (and I hope permanently) behind him, how

Hydrobuoyant Spheremotor

A chain of flexibly coupled, hollow rubber spheres loop over drive pulley and through air-filled "J" chamber. Underwater end of "J" chamber forms water seal as spheres go through aperture. Neglecting friction: Will this machine operate? If so, which way does it go?*

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Like to solve interesting problems?

Most engineers do—of the off-beat variety like the one above as well as the more practical ones you're always running into at Honeywell.

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a systems, analysis or component design man, with experience in calibrators, recorders, amplifiers, computing receivers or circuits.

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*Mathematical solution to above problem on request.

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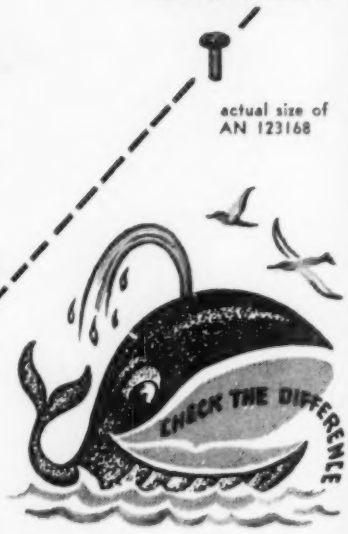
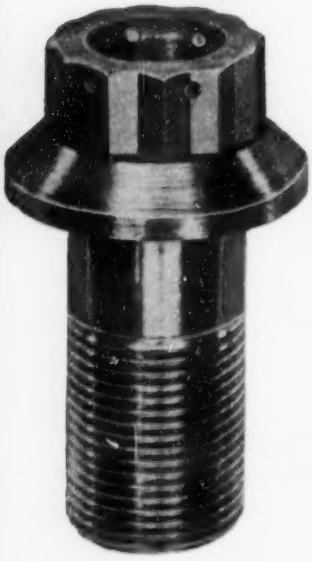
Each fastener is important in its particular Job. There is also a "WHALE" of a difference in the finished product as well, depending on Manufacturing Know How, Equipment, etc.

The rivet shown is used on Jet after-burners where they must withstand extremely high temperatures. We manufacture them in a variety of sizes from AN 123151 through 132262 of number 347 stainless steel.





Lockheed special 725400

This Lockheed special No. 725400 is a special High heat treat cold headed bolt with P.S.I. of 180,000 to 200,000, with a diameter of 1⅞" at the shoulder and 1⅛" dia. at the threaded section. The head is 12 point. The radius under the head and the threads are rolled after Heat Treat to control grain flow for strength. This bolt has a very high fatigue percentage. Ground before Heat Treat because of no decarburization, thereby eliminating surface strain.

We manufacture large bolts from NAS 464-3 thru sixteen AN 9 thru 16 . . . AN 173 thru 186 etc.

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3/32" to 1½" Dia.
EL SEGUNDO, CALIFORNIA

very fortunate those of us are who learned, long ago, to understand and trust Statistics.

Old friend or not, I keep wondering if I did right to let him go.

Long Live the Predictable Fatality! The risk that we are wrong is a minute figure, and we all know it.

ROBERT BLODGET
8746 Shoshone Avenue
Northridge, Calif.

(This may be a very subtle letter. We intend to read it a third time.—R.H.W.)

Hermes Project

Regarding the Industry Observer item involving our Hermes project in your Aug. 31 issue, the first sentence reads, "General Electric's Hermes missile project has been sharply cut by the Army with a heavy reduction in personnel at the Malta, N. Y., rocket test station." Actually, this reduction was really a transfer of personnel from Malta because of a reorganization of the engineering section of the guided missile department there.

This transfer was planned before any cut in budget was contemplated, and the fact that the two came simultaneously was a coincidence, purely. The budget cut has reduced the full scope of the originally planned development activity.

Also, the second sentence states that Hermes was a relatively short-range bombardment missile. Frankly, it is our feeling that the use of the passive verb here gives the reader the impression that the Hermes missile has been dropped. Certainly this is not the case.

Our missile project is still very actively engaged in work on the Hermes bombardment missile—even though the budget has been cut.

FRED KIRBY
Defense Products Unit
News Bureau
General Electric Co.
Schenectady 5, N. Y.

CAA Case Study

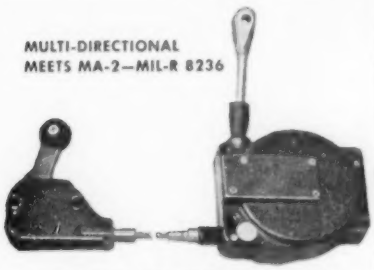
Concerning your coverage of interesting CAA news the information below may be worth printing. The following supervisory personnel left the Aircraft Engineering Branch to go on active duty with the Air Force in February, 1951, and have now returned to Region Six. These are all still in the Los Angeles office as of now:

Alcorn, GS-14, formerly Chief, Aircraft Division, now Chief, Aircraft Engineering Branch; Hawks, GS-13, formerly Deputy Chief Aircraft Division, now Deputy Chief, Aircraft Engineering Branch; Bache, GS-13, formerly Chief, Aircraft Engineering Branch, now Chief, Power Plant Branch; Bogert, GS-13, formerly Deputy Chief Aircraft Engineering Branch, now Chief, Airframe & Equipment Branch; Williamson, GS-13, formerly Supervising Project Engineer, now Supervisor Project Engineer. All grades are identical at present to grade at time of leaving for the Air Force.

The following supervisory personnel who were recruited or promoted to replace the above two years ago are still in the Region Six office:

Jacobs, GS-14, Chief, Aviation Safety

NEW PILOT PROTECTION WITH THE STURGESS MULTI-DIRECTIONAL Harness Reel



MULTI-DIRECTIONAL
MEETS MA-2—MIL-R 8236

HERE IS THE NEW STURGESS HARNESS REEL THAT PERMITS NORMAL PILOT MOVEMENT AND INSTANTLY SECURES HIM AGAINST INJURY IN EMERGENCY

MULTI-DIRECTIONAL in its protective function. Instantly activated by slight shock load protecting the pilot against injury on instrument panel or other projections.

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LIGHT WEIGHT—Entire unit, including manual control, weighs only 2 pounds—substantially less than MIL-R-8236 specifications.

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CONTINENTAL MOTORS · AMERICA'S STANDARD · Powerful as the Nation

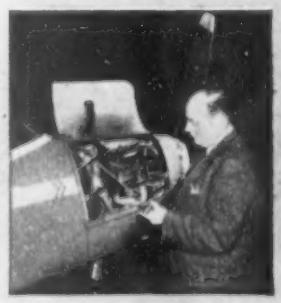
Dramatic Proof of AVIATION PROGRESS

Back in 1927, Charles Lindbergh hopped the Atlantic—one way—in his "Spirit of St. Louis" plane, and furnished the news story of that decade.

During the past summer, Peter Gluckmann touched his tiny Luscombe down on California soil after spanning the American Continent and the Atlantic, not once but twice, and created scarcely a ripple outside his own home town.

The matter-of-fact acceptance of that round-trip trans-Atlantic flight, in a plane strictly stock except for wing tanks, speaks volumes for the strides made by aviation in the 26-year interval between the two events. With airplanes hopping oceans every day, neither Peter Gluckmann nor the public seems to have viewed his flight as other than routine.

Mr. Gluckmann undertook that flight entirely on his own initiative, asking no help from Continental Motors or anyone else. Nevertheless, as manufacturer of the C90 engine on which he staked his life, this company naturally finds intense satisfaction in its outcome . . . in the fact that Continental stamina, fine product of advanced engineering and strictest quality control, has again proved equal to a challenge far greater than could possibly be encountered in normal use.



Continental Motors Corporation
Aircraft Engine Division
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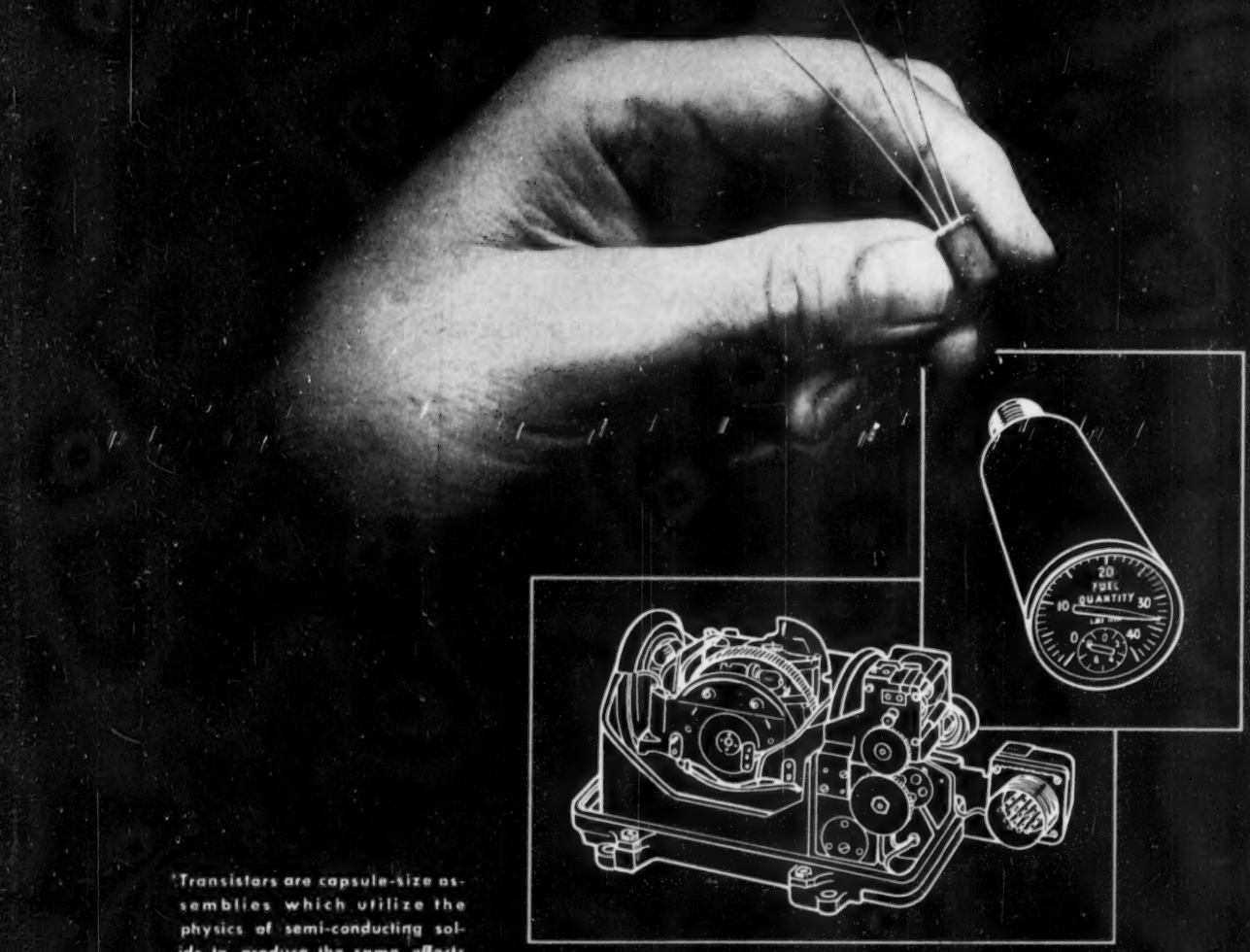
Transistors*

in aeronautical control...



*Transistors are capsule-size assemblies which utilize the physics of semi-conducting solids to produce the same effects as an electronic tube... but without cathode and/or filament and their circuitry components.

When ?

ONCE in a generation or more, there appears on the horizon an engineering accomplishment that becomes the object of wide discussion, enthusiastic comment and a great many predictions.

Such is the case with transistors today.

Anticipating Honeywell leadership, many aeronautical men have asked when our company will be announcing "transistorized" control.

Long before transistors started receiving public notice, Honeywell research groups in the Aeronautical Division and the Heat-Controls Division in Minneapolis and the Industrial Division in Philadelphia were experimenting with transistors. Honeywell management backed research with an investment in patent licenses with Bell Telephone Laboratories, the pioneers of transistors.

Remarkable results have already come out of this program. Today, we are proud to report the development and pilot line manufacture of transistors with sufficient power to operate control motors and to pull in relays . . . hermetically sealed transistors that should have infinite life.

Yet, even with our extensive research and development programs, much work remains. Such problems as temperature and circuitry must be further explored before transistors can be incorporated into production-line equipment. Even with concentrated effort, thorough engineering takes time . . . and it's worth time.

Honeywell aeronautical controls using transistors will be on the market at as early a date as possible, but only after they have met airborne requirements and have been proved to be worthy of our slogan "First in Controls." It won't be today. But, it will be soon.

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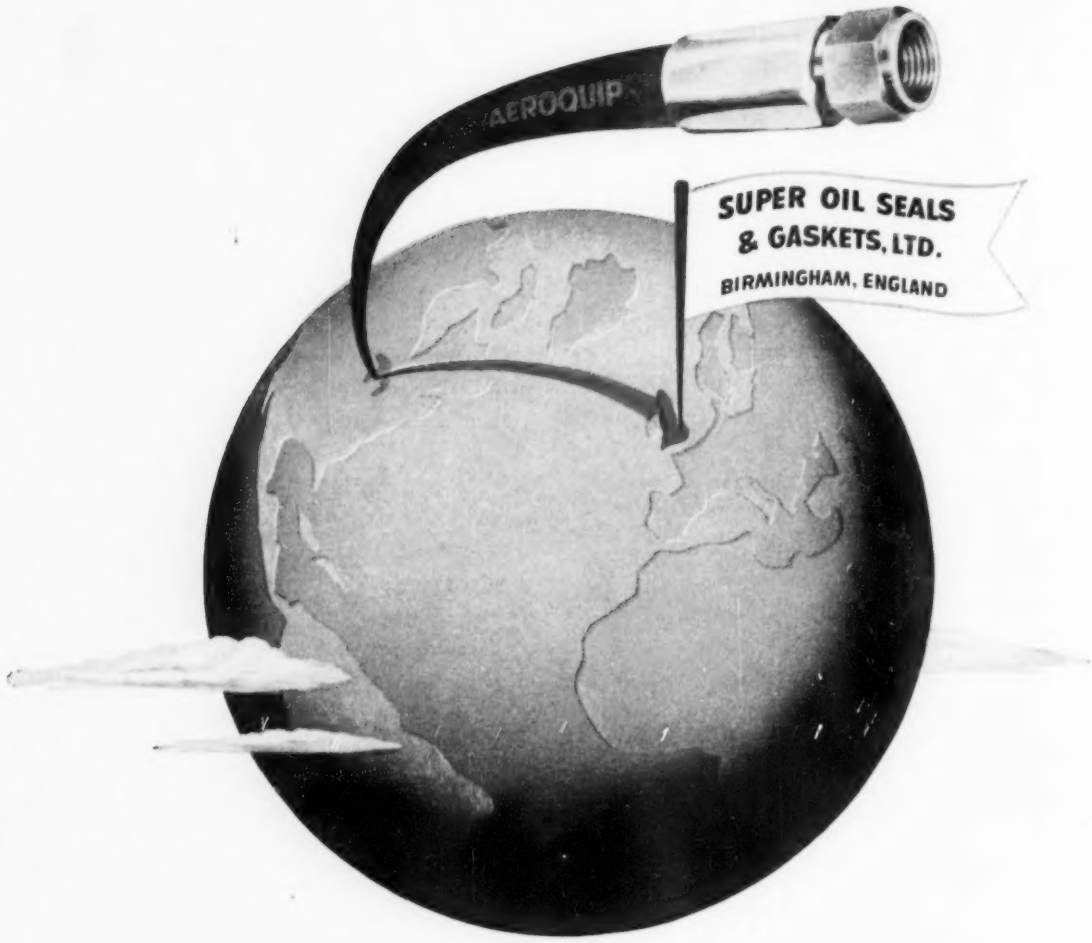
REG. TRADE MARK

. . . AND NOW, *in* BRITAIN!



There can be no doubt about it . . . American industry *likes* the "Aeroquip Idea" of making hose lines from bulk hose and detachable, reusable fittings. Naturally, this cost-cutting, inventory-reducing idea appeals to British industry as well. Ever alert for new opportunities, Aeroquip was quick to provide on-the-spot manufacturing sources to serve British markets. Super Oil Seals and Gaskets, Ltd., Birmingham, England, was licensed to manufacture Aeroquip Hose and Fittings. Thus, Aeroquip, the world's leading producer of hose lines for aircraft and industrial applications, has found new friends and important new markets.

Aeroquip products are manufactured in Canada under license by Prenco Progress and Engineering Corporation Ltd., Toronto.

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Division, "bumped" Klikoff—see below—; Yuravich, GS-14, Deputy Chief Aviation Safety, replaced Klikoff—see below—; Yagiela, GS-13, Supervisory Project Engineer, replaced Bache; Davis, GS-13, Supervisory Project Engineer, replaced Williamson; Lippis, G-13, Service Representative, replaced Bogert.

The whole picture is rather "fogged up" by the good old Hensley "reorganization" which took place some time ago. For example, W. A. Klikoff, Chief of the Aircraft Division in Seattle, was transferred to Los Angeles to replace Arner Alcorn, Chief of the Aircraft Division in Los Angeles, when Arner was called to active duty at Norton Air Force Base in San Bernardino. Subsequently, Hensley's little fiasco created a brand new position, Chief of Aviation Safety, for Klik and transformed the old Aircraft Division into the present Aircraft Engineering Branch. Note, however, that no matter how organization and titles were manipulated the grades and salaries remain at the same high (GS-14, GS-13) level!

Latest development is that Klikoff was bumped by his own deputy! Yuravich was brought from Seattle to take the deputy's place; and Klik has been transferred to Washington to take Omer Welling's old job. Irrespective of this finagling, the two newly created GS-14 positions of Chief and Deputy Chief of Aviation Safety are still occupied by someone.

No matter how the whole mess is "camouflaged" by organizational changes and academic title revisions, the important fact is that, where one GS-14 and five GS-13's (one, Col. J. K. Bussey is still at Wright Field) were entirely adequate when these men left for active duty, there are now three GS-14's and seven GS-13's doing essentially the same work!

Interesting sidelights are these:

1. Two of the newly created GS-14 positions, Chief and Deputy Chief of Aviation Safety, were brought on by what will some day be known as "Hensley's Folly." These high paid positions are positions the CAA (and the Aviation industry) got along just fine without until Ernie got to building his empire.

2. The position of Deputy Chief of the Aircraft Division (now Deputy Chief of the Aircraft Engineering Branch—but still at the same grade and salary) was vacated by Charlie Hawks early in 1951. No one occupied that position for almost two years (and still the industry struggled along) until Charlie returned to it a couple of months ago! Either there has been a sad deficiency for the last two years or Charlie won't be very busy—take your pick.

3. Back when the men left the L.A. office for Wright Field the Service Representative, a man who was ideally suited for that particular job and who had performed it to everyone's satisfaction for some four or five years, was removed from the Service Rep. position and assigned to the Lockheed project (against his own wishes) because "prospects of obtaining a GS-13 position as Service Rep. were nil." (Presumably, chances of getting a GS-13 as the Lockheed Project Engineer were pretty good.) Today, the incumbent Service Representative is a GS-13! Why? Simply because he was one of the excess 13s who was "left over" when

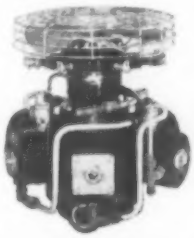
REPUBLIC AVIATION JOINS Cornelius FAMILY

CORNELIUS COMPRESSOR STANDARD EQUIPMENT ON F-84F THUNDERSTREAK

Republic's F-84F THUNDERSTREAK is the latest and fastest flying member of a rugged family which has long served the U.S. Air Forces' needs in the fighter and fighter-bomber field.

In equipping the F-84F THUNDERSTREAK with the CORNELIUS AIR COMPRESSOR Republic Aviation joins the CORNELIUS family of famous names in aviation ... Boeing, Canadair, Chance Vought, Douglas, Lockheed, Martin, McDonnell, North American, Northrop.

CORNELIUS is proud of this recognition ... developed from long experience building dependable pneumatic equipment for the Air Force, Navy and leading aircraft manufacturers. Profit from our experience ... write to us about your pneumatic equipment requirements.



CORNELIUS COMPRESSOR
4CFM ... 3000 PSI
Powered by integral hydraulic motor. Other models available with various pumping capacities. All compressors can be furnished with either hydraulic motors, DC electric motors or AC 400 cycle motors.

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Pioneers in the Development of
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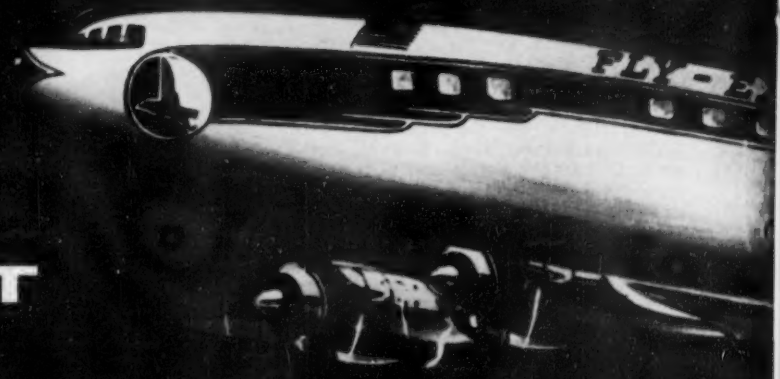

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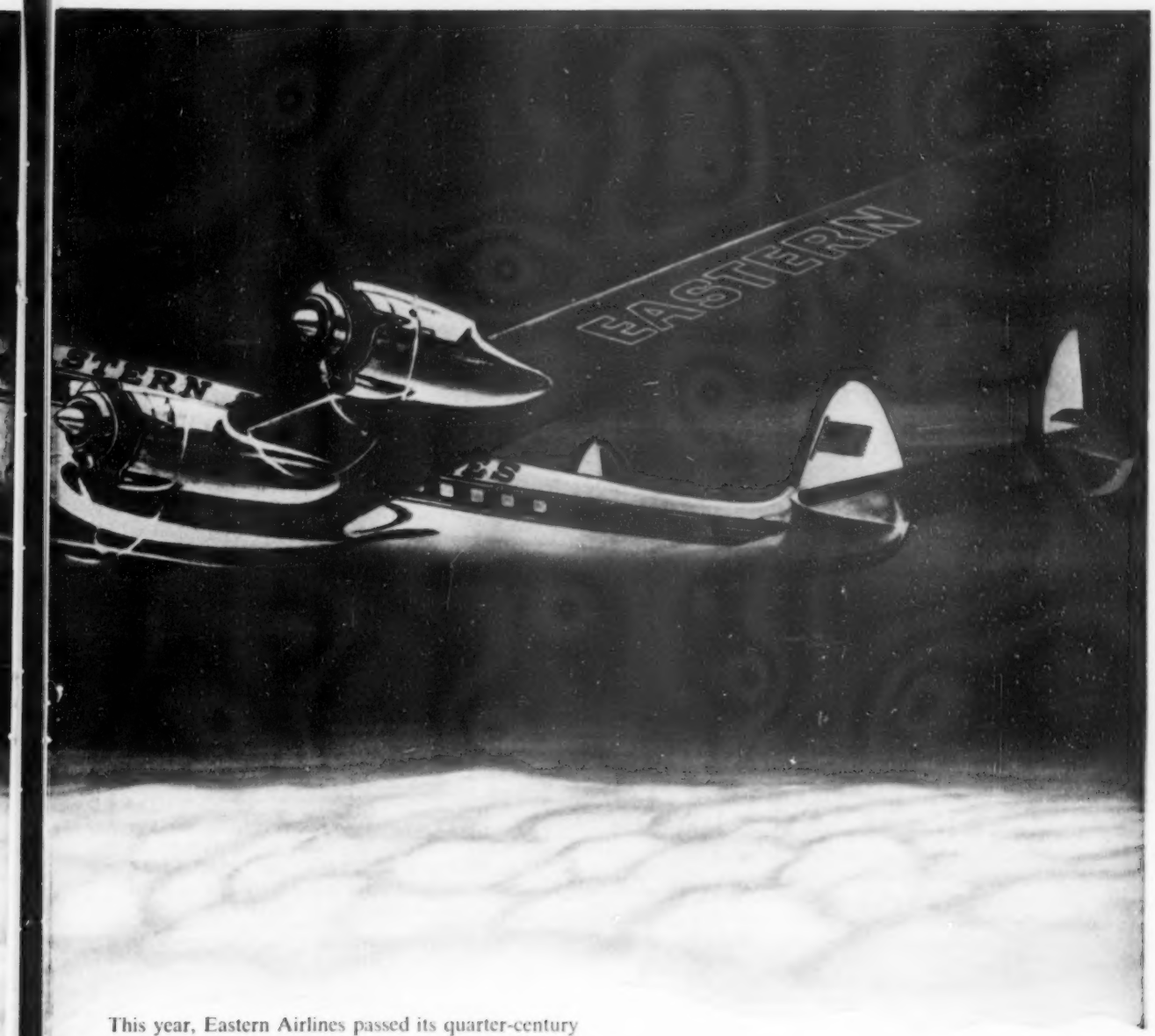

This year, Eastern Airlines passed its quarter-century mark of steadily-expanding service. Last year, for example, the Great Silver Fleet transported some 4 million passengers and averaged 170,000 miles a day over its network of air highways.

One important reason for Eastern's position in the Aviation industry is the fact that they test – *and select the finest products available.* Sinclair is proud that this year, again, Eastern has chosen to use Sinclair Aircraft Oil exclusively. *Today, more than 45% of the oil used by major scheduled airlines in the U. S. is supplied by Sinclair.* Why don't you place your confidence in Sinclair Aircraft Oil?

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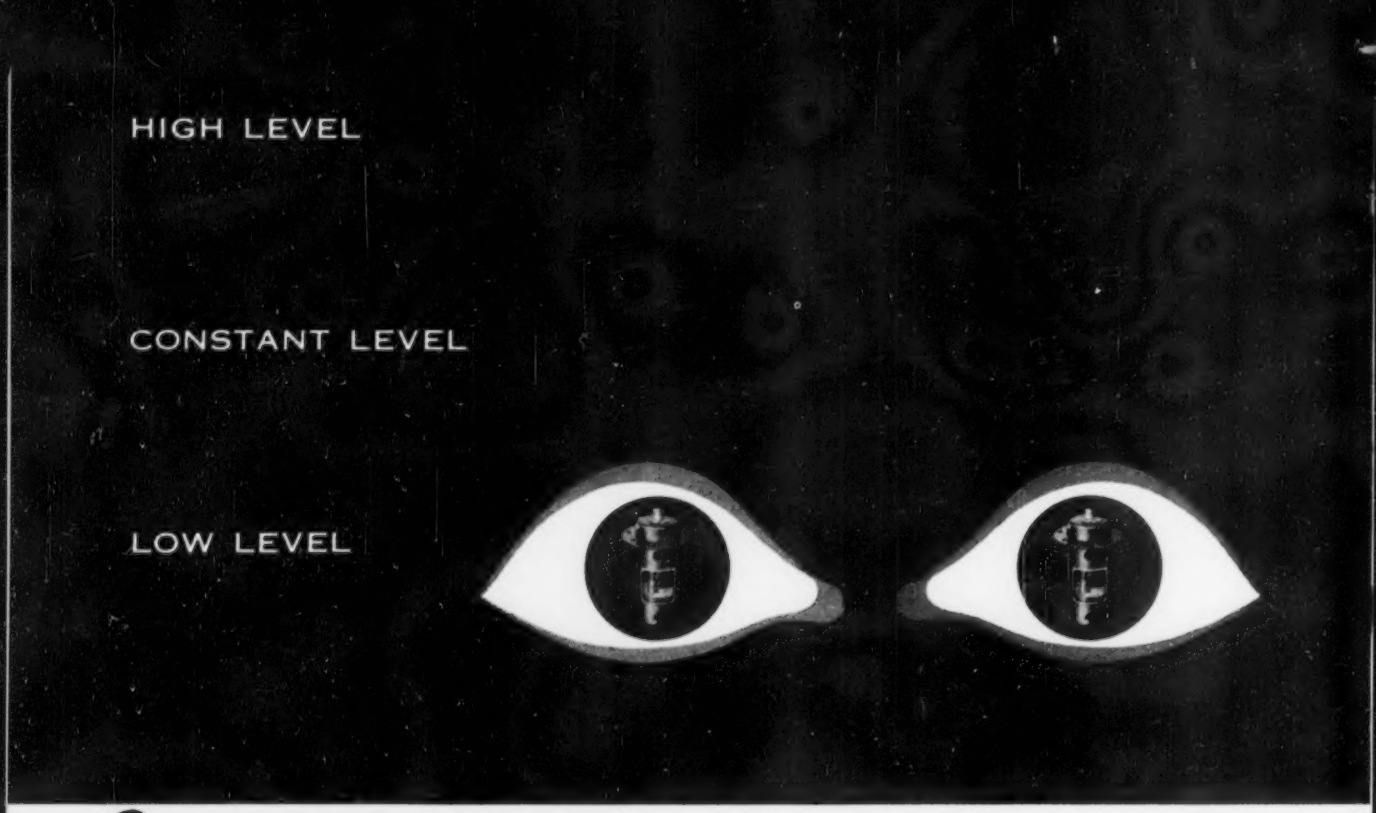
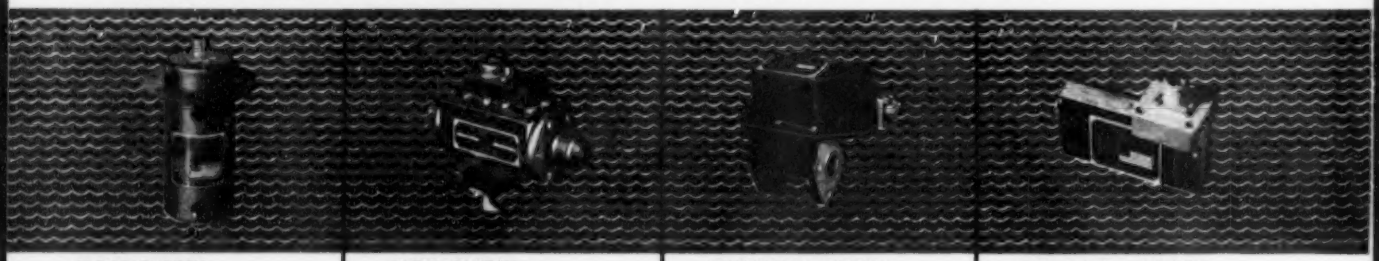


Revere INSTRUMENTS SEE WHERE YOU CAN'T

See *Revere* . . . if you need to know — **HOW MUCH LIQUID — HOW LITTLE — AT WHAT LEVEL.** *Revere's* precision made instruments are your unfailing eyes that see into sealed tanks, tubes or complex fuel lines. They can provide you with accurate measurement of liquid level regardless of pressure or temperature changes, vibration or rapid acceleration forces, AND they will automatically transmit a warning signal whenever liquid flow or level maintenance varies from a pre-determined value.

These hermetically sealed, magnetically actuated instruments employ balanced float assemblies to minimize false alarms. Compact and light, Revere instruments meet government specifications. They are available in many different configurations, some of which include relays to handle heavy electrical loads. Others are designed for complete submersion in fluids.

*Submit your control problem to our Field Engineering Department today. Revere will provide the instruments to tell you — **HOW MUCH — HOW LITTLE — AT WHAT LEVEL.** Shown below are some instruments that are the seeing-eyes of aircraft and industry.*



FLOAT SWITCH
Specially designed with single or dual float systems to provide automatic cut-off control for single point high pressure refueling.

FLOW SWITCH
Provides instantaneous warning signal whenever liquid flow falls below a pre-determined value. It can be mounted in any direction.

INDICATING SWITCH
Records the presence of fluid in a line whether stationary or flowing and transmits a warning signal if fluid condition changes.

FLUID LEVEL SWITCH
Used to maintain accurate high level, low level or constant level control of fuels, water-alcohol mixtures, beverages, etc. and other liquids.

SEND FOR FREE BULLETINS

REVERE CORPORATION OF AMERICA
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precision instruments for aircraft and industry

the Air Force boys came back to work. He is a fine engineer but his experience as Service Representative is nil, and he can't even fly an airplane! (The Service Rep. also represents the Flight Engineering Branch.)

4. There is still at least one Region Six Aircraft Engineer holding a GS-13 position open because he can't make up his mind whether he wants to return to CAA or make a career of the Air Force. A colonel has the right to return to his old position as Supervising Project Engineer, GS-13 (or an equivalent position) any time he makes up his mind to do so. He has been keeping CAA guessing as to whether he will demand his old job, and, if so, when.

CAA Observer
Los Angeles, California

Godfrey Supercharger

With reference to the article on Trans Canada Air Lines on page 49 of your Sept. 7 issue we note the following statement:

> "With the new planes will come many new accessories—AiResearch cabin superchargers and supercharger controls, Bendix fuel injection pumps. . . ."

This statement would infer that all of TCA's new aircraft will have AiResearch cabin superchargers fitted, whereas in fact only the Super Constellation aircraft will fall into this category.

The Viscount fleet will have Godfrey cabin superchargers, this equipment having proved to be extremely satisfactory in service with the North Star fleet.

It would be very much appreciated if you would publish a correction on this point.

W. F. S. Carter, President
Godfrey Engineering Co., Ltd.
480 Metropolitan Blvd., Lachine
Montreal 32, Canada

Fast and Hot

The speed achieved by the Hunter on its recent record attempt, 722 mph., corresponded to a Mach number of 0.94 approximately, assuming that the air temperature at the time was 70F. If the attempt could have been made at the Salton Sea Course on the same day that the F86D achieved 715 mph. (a Mach number of only 0.90, since the air temperature was 105F) the speed would probably have been on the order of 740 mph. (a Mach number of 0.93).

I have always suspected that American air enables airplanes to fly faster than the cold, wet, but invigorating atmosphere enables aeroplanes to do in England.

It appears that these suspicions are now confirmed. It is another proof, if more are needed, that the USA is God's Own Country.

W. C. J. Garrard
Apt. B., 5721 Claridge Circle
Dallas, Tex.

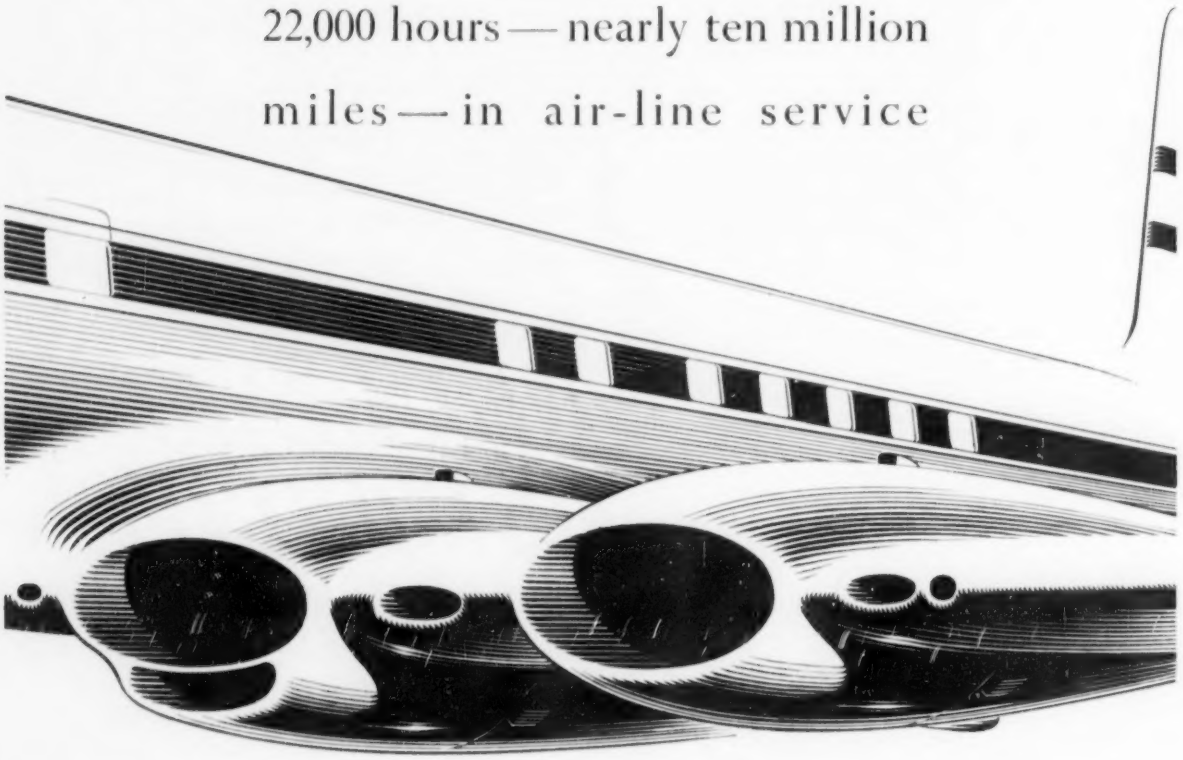
Light Power Unit

We want to thank you very much for the nice little write-up on our H-16 Standard Course Checker in Aviation Week Sept. 14, but hope you will give us a correction

COMET

The New World Airliner

Comets have already flown
22,000 hours — nearly ten million
miles — in air-line service



They are now clocking 150,000 miles a week

DE HAVILLAND
of GREAT BRITAIN

D/H ENGINES D/H AIRCRAFT

note in a later issue.

In the last paragraph you spoke of a 503 lb. power unit to supply 35 watts!! I am afraid that people will wonder whether progress is really being made in the electronics industry! The weight of the unit is 5.3 lb.

A. W. Parks, Jr.
Aircraft Radio Corp.
Boonton, N. J.

Praise

We would like permission from Aviation Week to reprint your article, "The Turbo Compound's Transport Fuel Saver." We want to include the reprint in a sales kit on "The Turbo Compound Story" which will be used for distribution to world airline customers.

William F. Kaiser
Public Relations Representative
Curtiss-Wright Corp.
Wood-Ridge, N. J.

ARDC Issue

Thank you . . . for the beautifully bound edition of "The Air Research and Development Command."

I share with you your commendation for the manpower stationed at various centers of the Command, whose patriotism and hard work deserve the unstinting support of all Americans. . . .

Theodore R. McKeldin, Governor
State of Maryland

. . . Certainly, you are to be congratulated upon putting out this publication. It contains a great deal of information which I think will be of real interest to everyone interested in the work of the Command.

I wonder if it would be possible to secure an extra copy for our Engineering library.

Joseph Weil, Dean
University of Florida
College of Engineering
Gainesville, Fla.

. . . You have not omitted any of the important phases of air research and development. Indeed, the issue is a tribute not only to the progress being made by American air power but also to the engineering genius which you, as publisher, have marshalled for Aviation Week.

Levin H. Campbell, Jr., President
American Ordnance Assn.
Washington, D. C.

The research and development activities of our company have been very closely allied with the programs of the Air Research and Development Command. We have found this special issue of Aviation Week most helpful in summarizing in a very useful publication the organization, personnel and facilities of ARDC. . . .

Harold L. George, Vice President and
General Manager, Hughes Aircraft Co.
Culver City, Calif.

I appreciate so much the copy of "The Air Research and Development Command" edition of Aviation Week . . . I will place this in my office and look forward to referring to it.

William Jennings Bryan Dorn, M.C.
House of Representatives
Washington, D. C.

Heat Treated Alloy Steel Pin with Malleable Aluminum Collar

REGULAR, CLOSE TOLERANCE AND INTERFERENCE FIT TYPES MANUFACTURED FROM ALLOY STEEL, STAINLESS STEEL AND 75ST ALUMINUM ALLOY

Hi-Shear Rivets of all types—in a full range of sizes are available through Pheoll's extensive manufacturing facilities . . .

NAS 177	100° Countersunk Head
NAS 178	Flat Binding Head
HS 2R7	Close Tolerance 100° Countersunk Head
NAA 2R6	Stud Rivets
HS 11	Brazier Head
HS 23	Close Tolerance 100° Countersunk Head—75ST Aluminum Alloy
HS 26	Flat Binding Head—75ST Aluminum Alloy
HS 27	Close Tolerance 100° Countersunk Head—Close Tolerance Shank
HS 28	Flat Binding Head—Close Tolerance Shank
HS 37	Close Tolerance 100° Countersunk Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
HS 38	Flat Binding Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
HS 47	Close Tolerance 100° Countersunk Head—Interference Fit—Minimum Tensile Strength 160,000 p.s.i.
HS 48	Flat Binding Head—Interference Fit—Minimum Tensile Strength 160,000 p.s.i.

Other Types of Hi-Shear Rivets made to customer's specifications. Aluminum Collars for all styles of Hi-Shear Rivets. Also Hi-Shear Rivets for industrial applications.

THE Hi-Shear Rivet consists of a hardened pin and a malleable aluminum collar. Driving may be done from either end. A simple one-piece rivet set is fitted to the conventional rivet gun (or is used as part of the bucking bar), or a pneumatic squeezer may be employed. As the collar is forced into the groove at the end of the pin, a ring of waste material is pinched off and automatically ejected, leaving a smooth low-rounded head.

FREE CATALOG and Engineering Data Sheets, Available on Request.

Time Reducing Features and Advantages

- Adaptable to high-speed riveting of even larger sizes than practical with soft rivets.
- Quick and positive visual inspection. No guess work as to proper installation. Gages or other checking devices not needed.
- No sharp edges or excessive protrusions. Protruding head and collar end are low and smooth.
- Work quickly drawn together. The collar opposes the rivet head and acts as own draw set—automatically draws the work together—instantly—firmly.

PHEOLL MANUFACTURING COMPANY
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AEROTEC AUTOMATIC CONTROLS

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the pilot and his plane

...Every major airframe manufacturer in the United States specifies AEROTEC Automatic Controls for at least one of his products. At today's trans-sonic speeds and split-second combat maneuvering, the pilot's very life and the safety of his plane are dependent upon these automatic controls.

Proved in thousands of military and commercial aircraft, AEROTEC Automatic Controls are today being specified by more and more manufacturers. These controls have passed extensive qualification tests *simulating actual flight conditions* in accordance with Spec MIL-E-5272 so that they can offer perfect performance under the most severe flying and combat conditions.

AEROTEC Automatic Controls for flap, landing gear and cabin heater applications, fuel transfer, flow indication, etc., have proved their performance record in flight, and have always given added safety to pilot and plane.

Let our qualified engineering staff help solve your automatic control problems. One of our specialists is near, ready to serve you. Call or write today.

When you think of Automatic Aircraft Controls, you should automatically think of AEROTEC.

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Designers and Manufacturers of Automatic Controls—*Valves:* Regulating, Relief and Check types—*Pressure Switches:* Gage, Altitude, Differential and Absolute Types—*Float Switches:* Top, bottom or side mounted—Single, Dual or Tandem.

WHAT'S NEW

New Publications

Recommended Practices for Spot Welding Aluminum and Aluminum Alloys, 33 pages, illustrated, has been issued by the American Welding Society as a design and manufacturing manual. Included is a table showing which combinations of aluminum alloys can and cannot be spot welded. Welding schedules are provided for frequency converter machines, rectifier, electromagnetic and electrostatic stored-energy and standard a.c. machines. Price is $1.00, from American Welding Society, 33 W. 39th St., New York 18.

An index covering the 27 monographs of the Massachusetts Institute of Technology Radiation Laboratory has been published. The monographs detail the essential features of the work of the MIT group, and include an account of the status of technical developments in the field in laboratories throughout the world to the end of World War II. Published by McGraw-Hill Book Co., 330 W. 42d St., New York 36. Price is $4.50.

Telling the Market

Solderless wire connectors and other specialized electrical fittings are detailed in Catalog 53, issued by Buchanan Electrical Products Corp., Hillside, N. J.

How to select, use and adjust tools for aircraft electrical connector installations is covered in illustrated instructional manual, distributed by Burndy Engineering Co., Inc., Norwalk, Conn.

Strain gages, instruments and accessories price list, covering 105 sizes and types of gages, is being distributed by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

Introduction to Flowrator Meters compares Flowrator variable-area types and variable-head types. Distributed by Fischer & Porter Co., Hatboro, Pa.

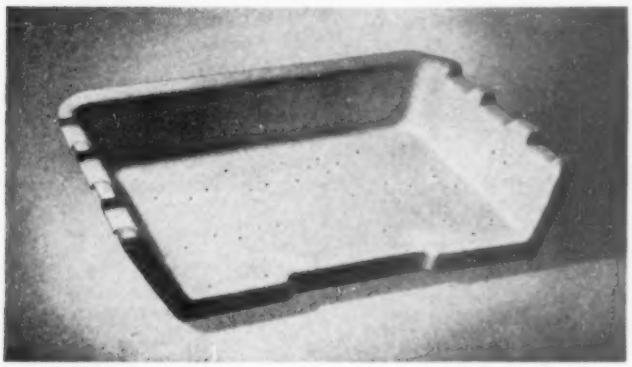
Use of beryllium copper to solve design problems is covered in booklet, Applications Unlimited, offered by the Beryllium Corp., Reading, Pa.

Welding equipment line of Miller Electric Mfg. Co., Appleton, Wis., is detailed in catalog of new SR devices, with their magnetic amplifier principle.

Aircraft electric motors ranging from 1/20 hp. to 16 hp. are illustrated in Bulletin 1535. Twenty-two different

THE CONNECTING JUNCTION—vital focusing point of all the elaborate electronic equipment of Lockheed's Navy P2V sub-hunter—is protected by a fibreglass "junction box" produced by Omohundro.

Whether it is for strength to protect against fragmentation, or precision plus speed of production, the aircraft industry has learned to depend on the Omohundro "O" that means *reliability*. For specific information, address Paul Omohundro Co., Box 696 Paramount, Calif. • TOrrey 7-9217



C. P. Waggoner Co., Southern Representative, Box 1107, Grand Prairie, Tex.

UNDRO

FLEX-O-TUBE®

When you specify Flex-O-Tube for flexible lines you get the utmost in *dependability* as well as *bendability*.

Manufacturing facilities are keyed to precise production control. This means you can depend on Flex-O-Tube delivery dates . . . and that's mighty important when you're working against tight production schedules.

Every needed inspection and testing facility is on hand at Flex-O-Tube to safeguard the high quality standards of every product shipped. You can depend on Flex-O-Tube performance.

Dependable, too, is the engineering counsel we gladly extend when you're developing new flexible hose products. This engineering know-how is based on more than twenty years in the business.

If there's a flexible line in your product to conduct air or liquid, that has to be bendable, call in Flex-O-Tube . . . it's dependable.

Supplied in Assemblies

Flex-O-Tube will help you determine the assembly needed or work to your own specifications. In either case, modern facilities and latest inspection techniques assure you a uniformly high quality product delivered promptly.

Supplied for Field Assembly

Flex-O-Tube hose is also supplied in bulk coils with reusable fittings for field assembly. Complete range of sizes and types.

Please send me your free ☐ aircraft catalog. ☐ industrial catalog.

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Company .....

City ..... Zone ..... State .....

Address .....

FLEX-O-TUBE

DIVISION OF MERIDAN CORP.

758 FOURTEENTH • DETROIT 16, MICHIGAN

models are described. Write U.S. Electrical Motors, Inc., P.O. Box 2058, Terminal Annex, Los Angeles 54, Calif.

Guide channels, seals and forming and bonding materials services developed by Standard Products Co. are described in bulletin available from the company, 2130 W. 11th St., Cleveland 2, Ohio.

Physical properties and pressroom and finishing room procedures for handling Formbrite fine-grain brass alloy are described in Publication B-39 being distributed by American Brass Co., Waterbury 20, Conn.

Gas turbine blade production is covered in 17-min., 16-mm. sound movie available on loan from Utica Drop Forge & Tool Corp., Utica 4, N. Y., care of Henry Zellweger.

Lowering production and maintenance costs by hard facing, application of hard alloy metal to a low alloy steel base, is described in a booklet available from Cleveland Hard Facing, Inc., 3047 Stillson Ave., Cleveland 5, Ohio.

Locating flaws by using surface-active chemicals is covered in booklet distributed by Turco Products, Inc., Terminal Annex 2649, Los Angeles, Calif.

Magnesium alloy and castings handbook provides considerable background on methods used and facilities being offered by Hills-McCanna Co., Foundry Div., 3025 N. Western Ave., Chicago 18, Ill.

Forging facilities for titanium, aluminum and alloy steels available to the aircraft industry are covered in brochure issued by Consolidated Industries, Inc., Mixville Rd., W. Cheshire, Conn.

Optical benches, including lathe-type, double- and single-rod and accessories, are covered in Bulletin 156-53 distributed by Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14.

Metallic cord for aircraft use is discussed in a new booklet, Elastic and Thermal Properties of Roebling Aircord, available from John A. Roebling's Sons Corp., Trenton 2, N. J.

Miniature speed changers in variable and fixed ratio varieties are covered in Technical Data Sheet M1, available on request to Meletron Instrument Co., 432 Lincoln St., Denver 3, Colo.

Inclinable presses with mechanical sleeve clutches are illustrated and described in Catalog 58L issued by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.

Industrial fire protection hose is described in bulletin available from W. M. Taylor, advertising manager, Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Tacony & Comly Sts., Philadelphia 24.

Will the product you plan to make...

..... need

an alloy so tough you may not yet have heard of it?

..... require

a forged finish like plate glass?

..... face

a man-made inferno?

You may even have a twist or two of your own to add to the problem the Jet Division helped solve for jet aircraft engine builders . . .

The "buckets" (paddles) on the turbine rotor at the rear of a jet engine whirl around about 10,000 times a minute, pulsed by a white-hot blowtorch of flame. To withstand this roaring inferno, the bucket surfaces and curves must be forged even smoother than glass. They must be made of an alloy tougher than the toughest steel. They must "take" this red-hot ride for hours without stretching out, or "creeping", from centrifugal force and heat.

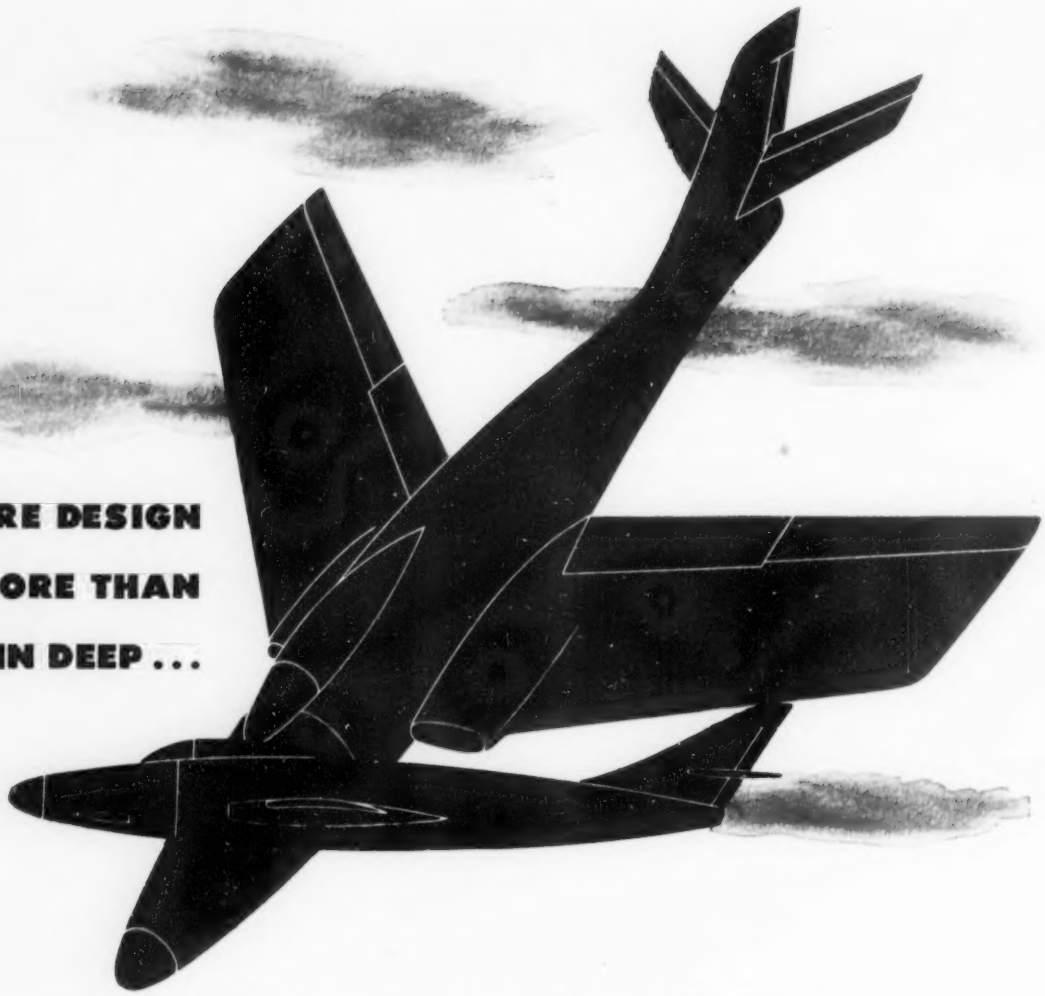
The Jet Division makes more buckets for America's engine builders than any other manufacturer. We forge super-strength alloys into finished parts so smooth and accurate that they need no costly, lengthy finish-machining or polishing.

If your product or product-to-come must meet one of these conditions . . . two . . . three, or, even a brand new one, it can pay you to get in touch with us now.

JET DIVISION

Thompson Products, Inc.

DEPARTMENT CC-10 • CLEVELAND 17, OHIO



WHERE DESIGN IS MORE THAN SKIN DEEP . . .

Modern aircraft design demands not only the ultimate in aerodynamics but comparable ingenuity and reliability in instrumentation and control components.

Contributing vitally to the substance of safety and dependability of many of today's most advanced production and developmental aircraft, our automatic control components and instruments are the result of continuous research, design and engineering tests *that eliminate all compromise with performance.*

Whether your design problems are concerned with turbojet engine control systems or such essential components as pressure switches, electronic amplifiers or hydraulic valves . . . you can depend upon our engineering ability, experience and manufacturing facilities to meet your most exacting requirements. At no obligation whatsoever, we extend an invitation to consult with our aircraft engineering specialists.

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AIRCRAFT PRODUCTS DIVISION • STRATFORD, CONN.

OUR AIRCRAFT PRODUCTS INCLUDE: TURBOJET ENGINE TEMPERATURE CONTROL AMPLIFIERS • ELECTRONIC AMPLIFIERS PRESSURE SWITCHES FOR ROCKETS, JET ENGINE AND AIRFRAME APPLICATIONS • PRESSURE GAUGES THERMOCOUPLES • HYDRAULIC VALVES • JET ENGINE AFTERBURNER CONTROL SYSTEMS.

Dielectric sealer use, together with complete product description, are subjects of EC-1120-PC bulletin being distributed by Minnesota Mining & Mfg. Co., Adhesives & Coatings Division, 423 Piquette Ave., Detroit 2, Mich.

Yard-Stor shelters for protecting heavy equipment and tools are detailed in bulletins being distributed by the maker, Yard-Stor Shelter Co., Detroit 3, Mich.

Riveting with Hi-Shears, fourth edition, contains revisions, including riveting and gun squeezer equipment recommendations, additional riveting hints, methods and identification for the trainee. Available from Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45, Calif.

Packaged adjustable-voltage drives for variable-speed applications are covered in booklet B-5808 being issued by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Broach bars and fixtures are detailed in booklet available from Cleveland Broach, Inc., 1061 East 260th St., Cleveland 23, Ohio.

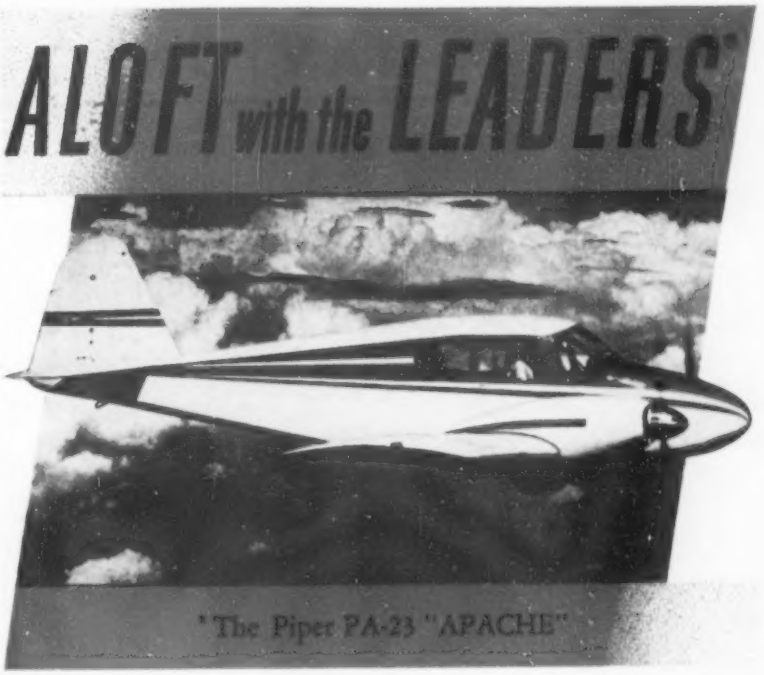
Toggle clamps for use on the production line are detailed in bulletin issued by Arc Welding Accessory Division, Frico Products, Inc., 2070 E. 61st Place, Cleveland 3, Ohio.

Instrument ball bearings are covered in catalog AIB which also deals with their classification, design and operating requirements. New Departure Division, General Motors Corp., Bristol, Conn.

The Creative Approach to Better Wiring is booklet presenting a planned wiring program for products. It is available from Aircraft-Marine Products, Inc., 2100 Paxton St., Harrisburg, Pa.

Publications Received

- **Introduction To Aeronautical Dynamics** by Manfred Rauscher, pub. by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., $12.00. Seeks to give the student a broader and deeper grounding in dynamical principles than had been needed in the past.
- **Ultra High Frequency Propagation** by Henry R. Reed, and Carl M. Russell, assisted by W. M. Browne and J. W. Plummer, pub. by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y., $9.50. This work makes available the most recent information on new developments in the field of ultra high frequency radio wave propagation.
- **Modern British Aeroplanes** by Charles Gardner, pub. by Temple Press Limited, Bowling Green Lane, London, E. C. 1, $1.80. The author explains in language easily understood by the average boy the whys and wherefores of the many new shapes now seen in British skies.



In the category of personal aircraft,
there is no name better known than *Piper.*
Leading the trend in this field
toward faster, safer, roomier planes
is the new twin-engined Piper PA-23 "APACHE".
For this sleek ship — practical for
night flying under instrument control —
Electrol engineers integrated their
technical skill with that of
Piper designers to build
the necessary hydraulic components.
This same coordinated effort is at the
disposal of all aircraft manufacturers.

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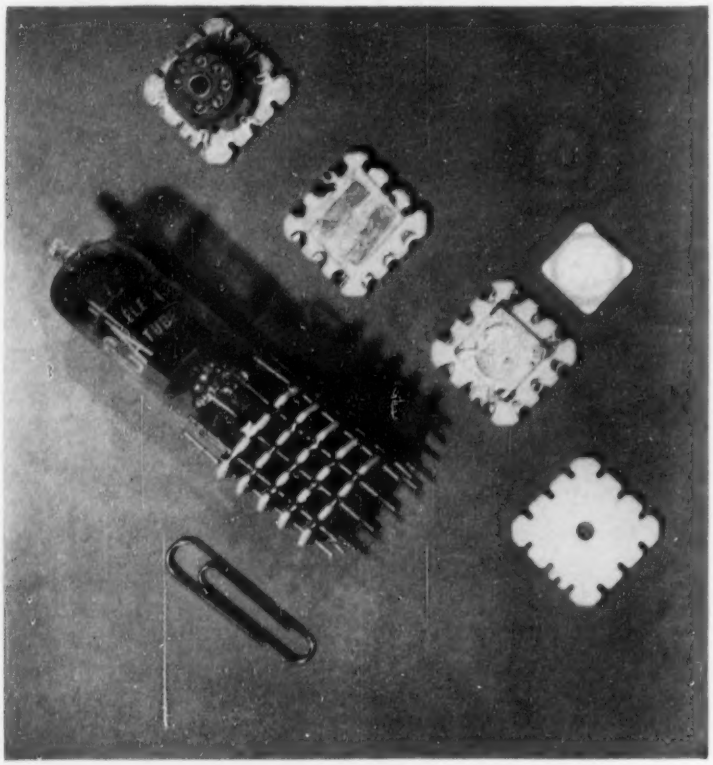
Better Designed Products Use Electrol Hydraulics



TINKERTOY MODULE combines tube with necessary circuit components that have been assembled and wired by automatic machines. These modules may well be the avionic and electronic building blocks of the future.

Automatic Plant: From Powder To Product

The method is at hand to satisfy industry's great and growing appetite for avionic components.

Answer to this need is the nation's first "automatic factory" for mechanized production of electronic parts (AVIATION WEEK Sept. 28, p. 17). Starting at one end with raw materials, the factory uses radically new techniques to spew out at the other end a stream of electronic modules consisting of a tube and associated resistors, capacitors and wiring.

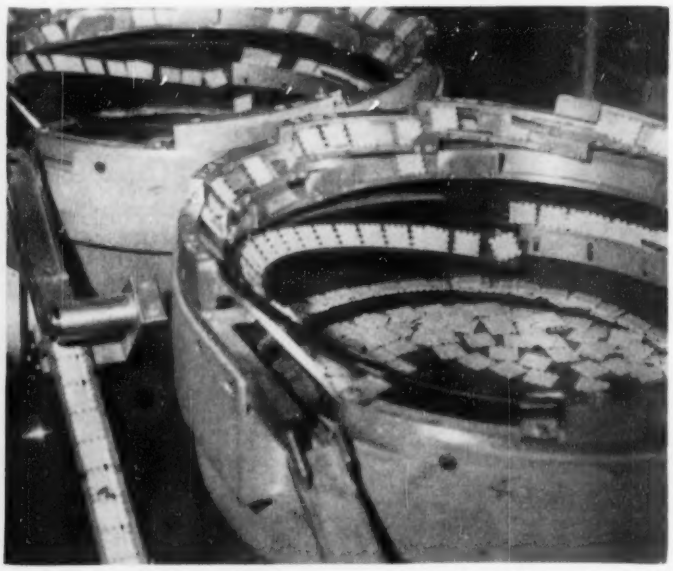
▶ **Wafers and Ink**—Called Project Tinkertoy, the process combines use of printed-circuit techniques with wafer building blocks that are assembled into modules for specific purposes.

The ceramic wafers, seven-eighths of an inch square, are stamped and pressed from a mixture of talc, kaolin and barium carbonate at the rate of 2,800 an hour.

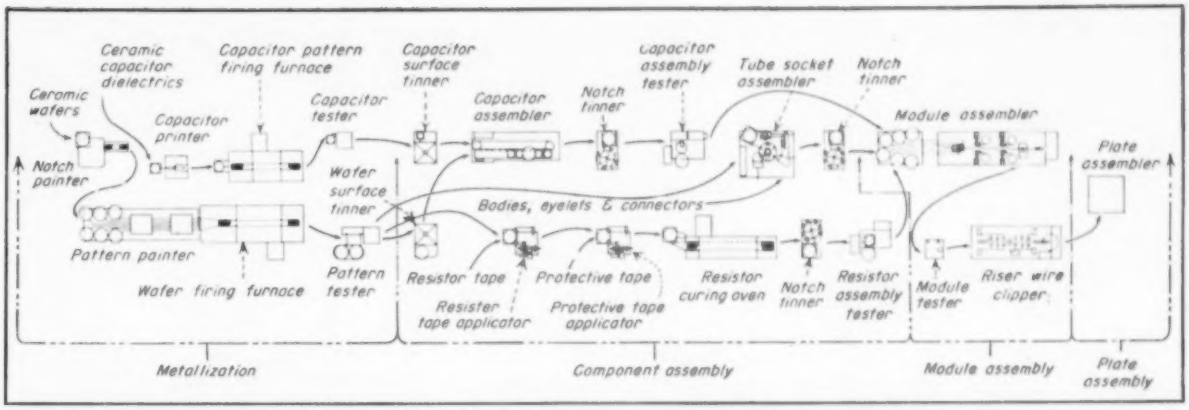
Complete assembly of the wafer-mounted parts is done in a single machine. Six vibratory

(Continued on page 74)

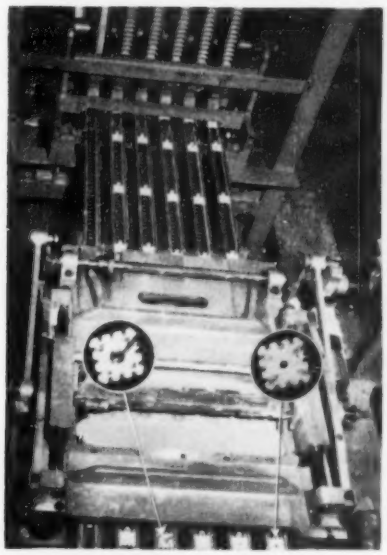
1. CERAMIC WAFERS less than an inch square (see inset) are stamped and pressed here at rate of 2,800 an hour. After 9-hr. oven cure, notches are silver-painted.



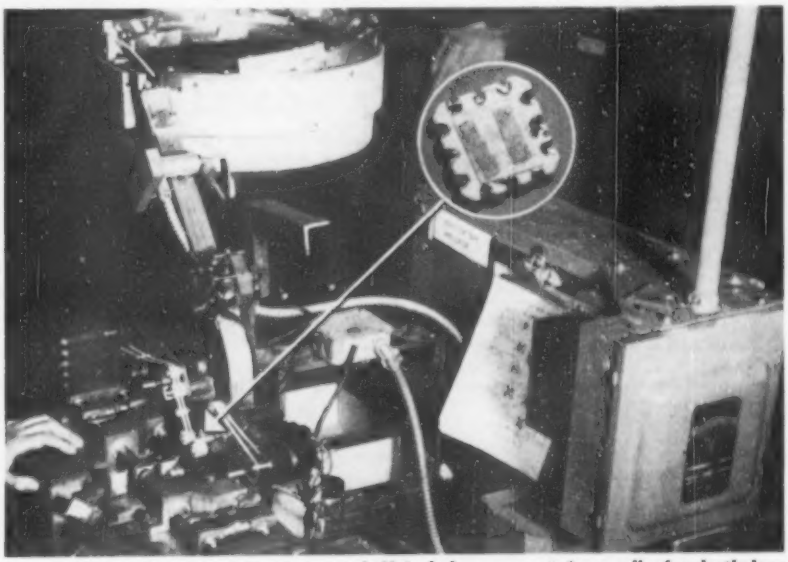
2. CIRCULAR SORTER automatically rotates wafers until each is properly aligned relative to small index notch cut in one edge for next operation. Tube sockets and titanate capacitor bodies are produced in a similar manner.



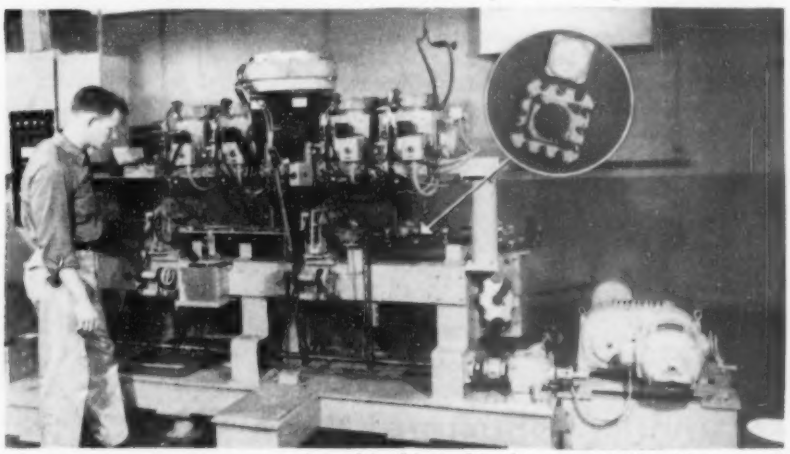
FLOW SHEET shows layout of Tinkertoy pilot plant that converts raw materials into finished modules. Plant is being operated for Navy by Kaiser Electronics Div. of Willys Motors. Capacity is 1,000 modules an hour.



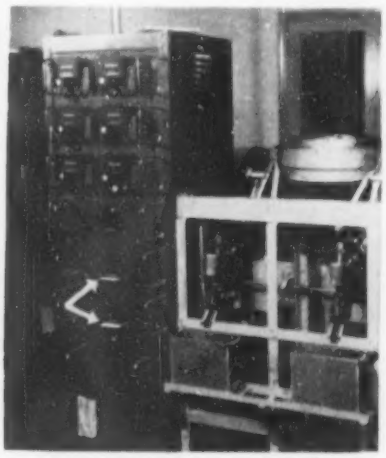
3. PRINTER silver-paints six wafers simultaneously with required pattern of conductors which connect to wafer notches. After another oven cure, wafers get automatic test.



4. TAPE RESISTORS one-half inch long are cut from roll of polyethylene tape on which carbon and resin have previously been sprayed. Resistors are applied across previously printed conductor surfaces. At next stop, protective tape cover is applied. Resistance values (from 10 ohms to 10 megohms) depend on density of carbon deposited in manufacture.



5. CAPACITORS are formed in this machine by automatically soldering small printed capacitor wafers to the conducting surfaces on the body wafer. Up to two capacitors, ranging from 7 micro-microfarads to 0.01 microfarad may be attached to each side of the large wafers.



6. TESTING on automatic machines is guided by punch-card directions (see arrows). Tinkertoy picture sequence continues on page 74.

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CUTTER HEAD CUTS SPAR MILLING COSTS

CUTS COSTS . . SAVE TIME

Onsrud SERT-A-BLADE wedge type spar milling cutters with serrated, inserted carbide tipped blades are engineered to proper rake and shear angles for milling aluminum spar sections. Knife faces are spiral ground to maintain positive rake throughout entire length of blade, for better, smoother cutting. Serrated, insertable blades are secured by bolted wedges, . . . safe, secure, easier to remove. Designed to allow adjustment to compensate for wear and repeated sharpening. Permits full use of practically the entire carbide tip. MAIL COUPON NOW for full details.

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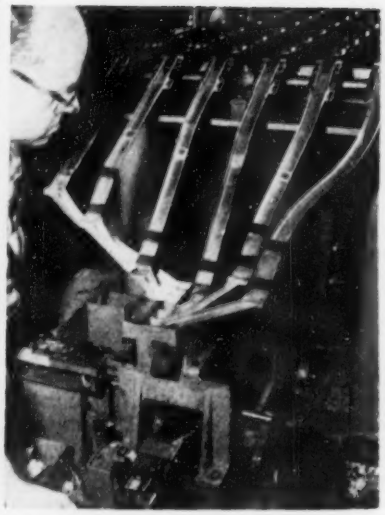
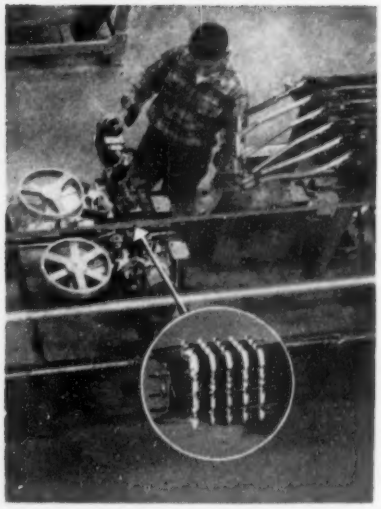




7. MODULE ASSEMBLY takes place in this machine, where four to six completed wafers, including tube socket wafer and non-printed components such as coils, diodes, etc., are fed into loading device that positions them so that riser wires can be fed from large reels and soldered to tinned notches in wafer edges (right photo). Chipping riser between wafers creates open circuit.

feeders issue the wafers to a loading jig that holds them upright. The jig carries the wafers to a soldering position where six wire risers are guided into notches, three on a side, and are automatically soldered. The assembly is then turned and six more risers attached.

The risers give the part rigidity and provide the electric paths. By snipping the riser at any given point between two wafers, that particular path is eliminated.

The module assembly may be joined with as many as 10 others on, or between, copper plates in which circuits have been etched to make a complete electronic circuit. Several such plate assemblies may be combined to form an entire equipment.

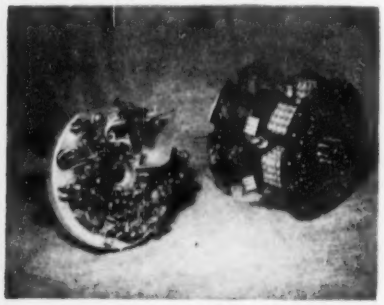
Provision is made for automatic inspection at every stage of production.

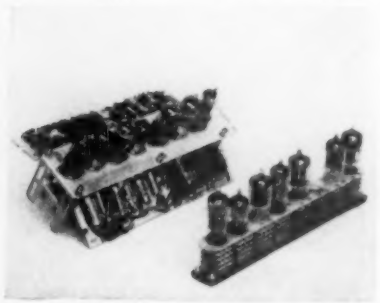
▶ **Modular Design**—The basis for the Tinkertoy system is MDE—modular design for electronics. Dispersing with the conventional electronic circuit diagram, it places all necessary production planning on an MDE worksheet. The engineer translates the conventional wiring diagram to an MDE diagram based on wafer notches, wires and the electronic parts that are to go on the wafers.

The worksheet is used to make stencils for the circuit-printing machine, to establish inspection points and procedure, to indicate what quantity of raw materials must be mixed, the number and value of tape resistors that must be produced, etc.

▶ **Preparedness Measure**—The program for mechanized production of electronic equipment—MPE—was sponsored by BuAer as an industrial preparedness measure. It aimed at breaking the electronics bottleneck that we would likely face in an all-out emergency, as a result of lack of sufficient trained personnel.

Tinkertoy, the fruit of MPE, was





8. MODULE GROUPING to make a complete equipment or major assembly can take a variety of forms. Modules may be positioned on baseboard either manually or by machine and then secured to baseboard printed conductors by dip soldering. Left photo compares Tinkertoy version of submarine detection device (right) with old assembly. Right photo compares streamlined radio altimeter with old model.

To keep pace with the rapid development of faster, higher-performance aircraft, General Electric engineers have developed a . . .

New G-E Flight Control System Designed For Tomorrow's Aircraft

The new General Electric FC5 Flight Control System was developed to meet the stability and flight control requirements of advanced planes which will roll off production lines beginning in 1955.

The FC5 represents new engineering concepts beyond the currently successful G-E systems now installed in the Navy's Chance-Vought F7U-3 Cutlass, Douglas F3D-2 Skyknight, Grumman F9F-5P Panther and Grumman F9F-6P Cougar and the McDonnell F3H Demon.

CAN BE CUSTOM-DESIGNED

The FC5 is a fundamental system concept which can be custom-designed from a family of integrated components. The number of components, and in some cases their actual designs, can be varied to suit specific applications.

Designed to perform a wide range of functions, the FC5 can fulfill the relatively basic requirements of a single axis damper system or the many requirements of a fully automatic relief and maneuvering system including stabilization in all three axes.

RELIABLE AND LIGHTWEIGHT

Reliability and lightweight are only two of the FC5's design features. It will also incorporate 1) automatic pitch trim 2) "G" limiting in automatic modes of operation to prevent overstress of the aircraft during maneuvers 3) continuous synchronization of autopilot during manual maneuvers 4) immediate pilot take-over at any time—through the stick and rudder pedals—with no transient in the system. The FC5 also has been designed to operate in conjunction with bombing, fire control, navigation and ground control systems.

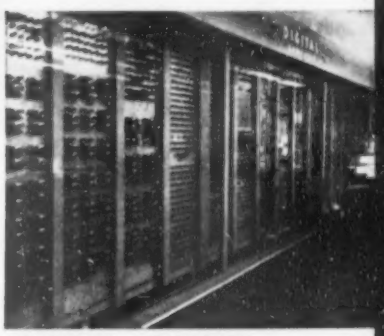
FC5 BULLETIN AVAILABLE

The FC5 is another in the long line of G-E products engineered by the men who know the needs of the aviation industry. If you would like more information on the FC5 system, write for bulletin GEA-6039. Section 210-84, General Electric Company, Schenectady 5, N. Y.

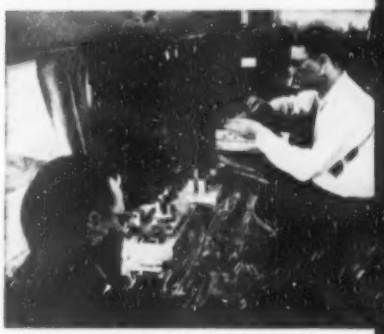
You can put your confidence in—

GENERAL ELECTRIC

ENGINEERING SPECIALISTS at G.E. work as a team constantly improving present equipment and outlining future system plans.

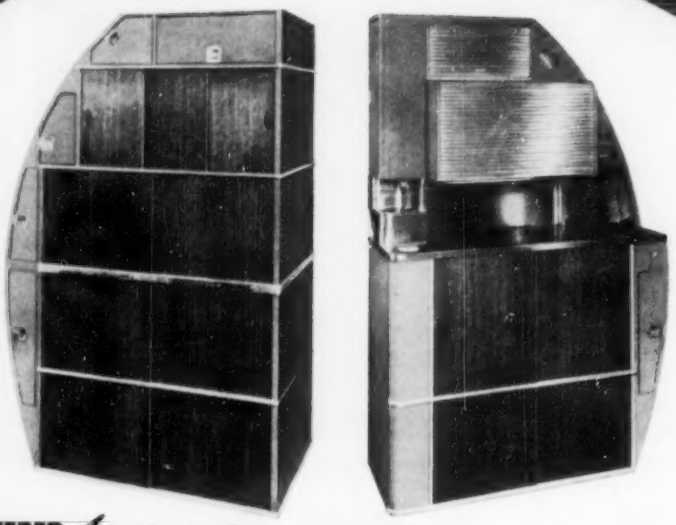


RESEARCH FACILITIES include both analog and digital computers for complete analysis of the performance of systems and their components.



FLIGHT TESTING at G.E.'s Flight Test Center, Schenectady, N. Y., keeps new developments abreast of the requirements of higher-performance planes.

G-E AUTOPILOTS are now in operational use in some of the Navy's hot planes and are being installed in a new one—the McDonnell F3H Demon.



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PROJECT 101 at Weber Aircraft was an interesting one. A customer asked for the finest buffet in the skyways. It had to be strong, have smart appearance, occupy a minimum of space and provide maximum efficiency in airplane food serving.

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developed by the National Bureau of Standards with the aid of several industrial contractors.

The pilot plant is operated for Navy by Kaiser Electronics Division of Willys Motors. Kaiser Electronics started design in January 1951 at Detroit. In September 1952, the machines were transferred to an NBS facility in Arlington, Va. By May 1953, machine modification and tryout had been virtually completed and BuAer awarded Kaiser Electronics the contract for pilot production.

► **Engineering Applications**—Sanders Associates, Inc., Nashua, N. H., has been awarded the task of designing and proving major engineering applications of Tinkertoy. Royden C. Sanders, Jr., expects the process to be made applicable to virtually all electronic equipment, including radio and television. Among the electronic equipment engineered by Sanders for the new technique are a submarine detection device (now on the pilot plant production line to evaluate service reliability), a radio altimeter and a radio control receiver.

A number of other companies assisted in the working out of Project Tinkertoy. Doughnut Corp. of America, Ellicott City, Md., made a number of special machines; Communication Measurements Laboratory, Inc., Plainfield, N. J., provided specially designed automatic production test equipment; Davies Laboratories, Riverdale, Md., and Navy's Post Graduate School, Monterey, Calif., also took part in some phases of the work.

Tinkertoy's sponsors believe that MPE has shown the way to a 75% reduction in lead time of finished electronic equipment.

SMALL SET

Miniature intercom system developed and produced by North American Aviation's Downey (Calif.) plant for use in its new T-28B trainer is evidence of NAA's growing activity in the avionics field. Intercom provides for communication between cockpits as well as switching for six communication and navigation signals.

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When you have to go straight up from a standing start, weight saving is of prime importance. That's why designers of helicopters are making extensive use of magnesium, the world's lightest structural metal.

The range and capacity of one current production model helicopter have been greatly increased by the use of magnesium. In this ship the requirements of magnesium are equal to approximately 25% of the craft's total empty weight. This consists of 400 pounds of castings, comprising 90 different parts, and 700 pounds of sheet and extrusions, including nearly all of the fuselage skin.

The weight saved by the use of magnesium has helped increase the efficiency of helicopters. Where only yesterday these craft were novelties, today they are the real work horses of our armed forces.

Whenever you have a weight problem, investigate magnesium. One-third lighter than aluminum, magnesium offers you an exceptionally high strength/weight ratio. It is a practical metal, available in all common forms, workable by all standard shop methods. For complete information, call your nearest Dow office or write to: Magnesium Department, THE DOW CHEMICAL COMPANY, Midland, Michigan.

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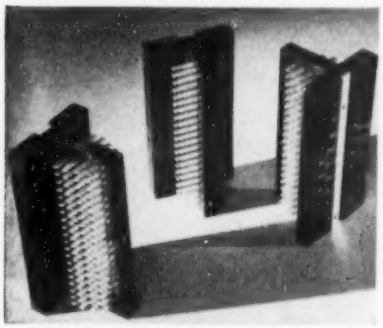
DOW

Makers Announce Avionics Components

A variety of new components suitable for application to avionic equipment have been recently announced. The new devices and their highlights are listed below:

• **Switching commutator.** A multichannel rotary highspeed switching commutator for use in telemetering or rapid-sampling circuits has been announced by G. M. Giannini & Co. Device weighs 3½ oz. and is available with one or two poles and a maximum of 45 terminals on one pole, 15 terminals on the second pole. Commutator employs dust-proof construction and is available with either break-before-make or make-before-break type contacts. G. M. Giannini & Co., 117 E. Colorado St., P.O. Box N, Pasadena 1, Calif.

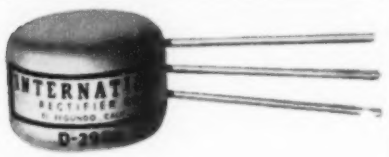
• **Terminal blocks.** Phenolic terminal blocks are available with 40, 60, 80 or

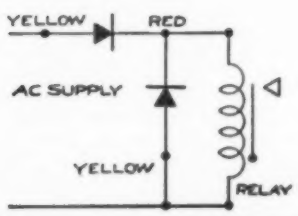


100 pre-tinned double-notched terminals from Lenkurt Electric Co., County Road, San Carlos, Calif.

• **Rectifier-suppressor.** This is a dual-section rectifier for use with d.c. relays operated from an a.c. supply. One section provides half-wave rectification for the relay operating coil; the other provides a path for the current resulting from the collapse of the magnetic field in the relay coil during the non-conducting half-cycle.

Device, identified as Type D-2906,





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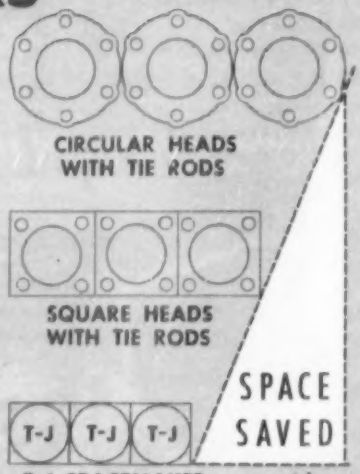
These new T-J Cylinders *save up to 40% in mounting space*—with streamlined design that eliminates tie rods. They're *super rugged*—extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, hard chrome plated piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 8152 The Tomkins-Johnson Co., Jackson, Mich.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

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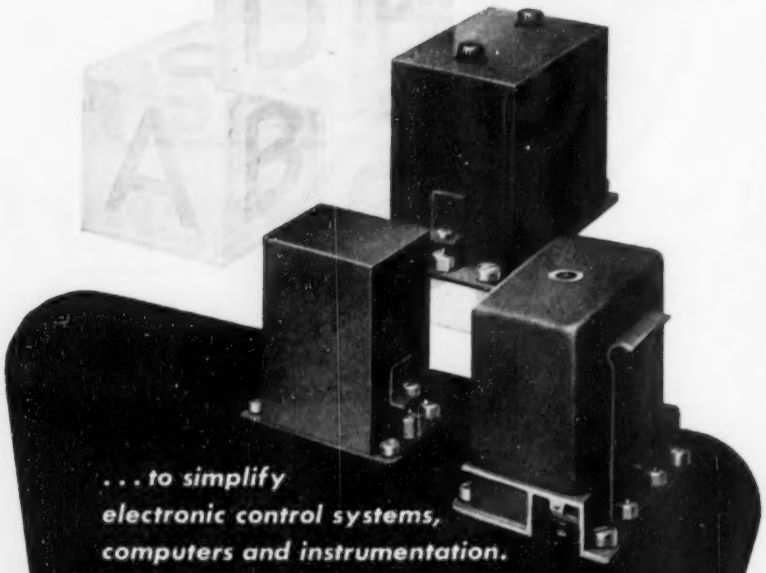

. . . to simplify electronic control systems, computers and instrumentation.

Servomechanisms, Inc. "building block" or packaged function technique reduces intricate "all in one" systems into simple, standard electronic components which plug into pre-wired chassis. This advanced design philosophy provides ***reliability, interchangeability, and ease of maintenance.***

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Universally accepted and proven in combat these "building blocks" are available for 60 and 400 cycle applications. Write to Dpt. 105M-4 for complete information.

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is encapsulated in a thermosetting plastic and is rated at 48 v. maximum and 5 ma. output at 100C, making it suitable for aircraft use. Manufacturer is International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.

• **Pulse-forming network.** A new line of miniature pulse-forming networks, identified as the NC-34 series, is available from the National Capacitor Co. Typical network, built to a customer's specs, has pulse width of 0.5 microseconds at 70%, a rise time of 0.12 microseconds and a pulse repetition rate of 1,000/sec. Unit is rated at 3 kv. d.c., 0.005 microfarads, 50 ohms impedance, and operates at temperatures up to 90C. Its dimensions are 1⅛x1¼x⅜ in. Company address is 585 Washington St., Quincy, Mass.

• **IF transformers.** Single- and double-tuned circuit intermediate-frequency transformers, for operation at frequencies of 50 kc. to 100 mc. are available in plastic encapsulated form for operation at temperatures of −65C to 130C and up to 100% humidity from Vanguard Electronics Co., 3384 Motor Ave., Los Angeles 34, Calif.

• **SSB filters.** New series of filters for use in single-sideband (SSB) receivers for operation at 25 kc. intermediate frequency, is available from Burnell & Co., 45 Warburton Ave., Yonkers, N. Y.

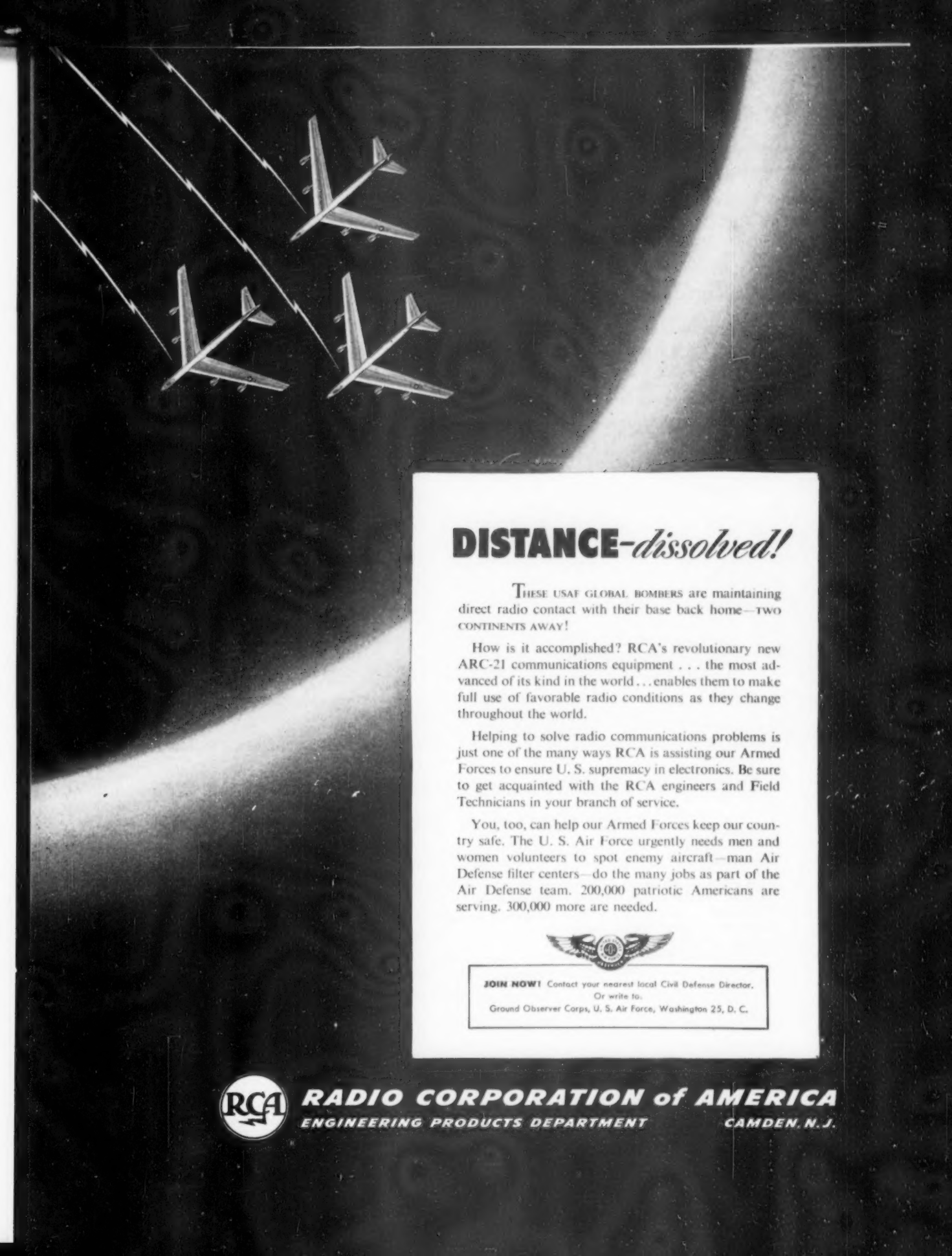
FILTER CENTER

► **Sub-Min Glide-Slope Receiver**—Air Force is reportedly considering production procurement of the new Collins Radio AN/ARN-22, a sub-miniaturized version of the presently used AN/ARN-18 glide-slope receiver.

► **Transistorized Fuel Gages**—Two capacitance fuel gauge manufacturers, Minneapolis-Honeywell and Avien-Knickerbocker, are developing units which use transistors in place of vacuum tubes. The M-H development is under Air Force contract and the first experimental unit should be ready for test within a year, according to an AF spokesman.

► **Hydraulics for Radar**—North American Aviation is investigating the possibility of using hydraulics in place of electric motors to position and rotate an airborne radar antenna.

► **Magnetics Research**—Indiana Steel Products Co. has been awarded a contract for basic and applied research into magnetics by USAF's Air Research & Development Command. Program will include development of new magnetic theories, alloys, and design factors for magnetic circuits. —PK



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Or write to:
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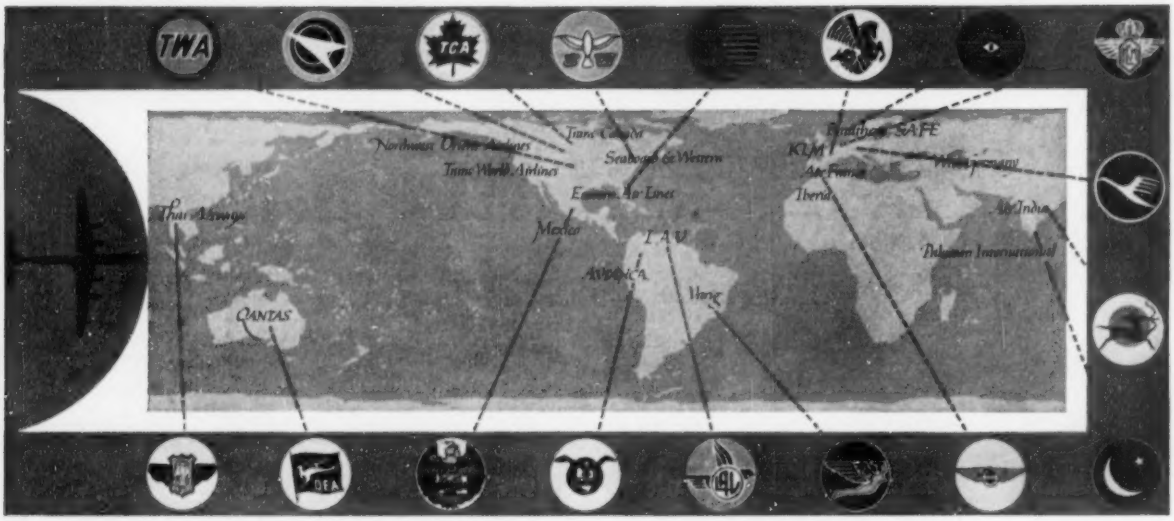
It's Super Constellation 4 to 1



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...TWICE AS MANY AS FOREIGN JET TYPES

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NEW SPEED—*Hours* quicker to destination. *On time* departures, and *on time* arrivals!

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NEW POWER—13,000 horsepower! Latest type turbo-compound Wright engines. Power to spare means *better performance, better dependability.*

NEW COMFORT—5 separate cabins to roam through. Interior design by Henry Dreyfuss for people who *enjoy* travel.

NEW LUXURY—Spacious lounge and glamorous decor *unlike any other airplane* in the world.

INSIST ON SUPER CONSTELLATION! IT COSTS NO MORE TO FLY THE BEST!

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EQUIPMENT

BOAC Tells Conference Why . . .

Comets Use High-Energy Ignition

This type of sparking is necessary for relighting jets at high altitudes, Champion spark plug meeting hears.

By George L. Christian •

Toledo—High-energy ignition equipment for jet engines is a must. That is British Overseas Airways Corp.'s experience with the Rolls-Royce Ghost in the de Havilland Comet.

Prime reason is that the high-energy igniter provides satisfactory relighting sparks up to 25,000 ft. The original ignition equipment, the Lucas torch igniter, while reasonably satisfactory, had the inherent disadvantage of being limited to an 8,000 ft. relight altitude "above which altitude relights were uncertain," BOAC says.

▶ **Jet Ignition Experience**—BOAC's ignition experience with the Ghost engine in the Comet was reported to the Champion Aircraft Spark Plug and Ignition Conference recently held in this city. Here are the highspots of the report.

• **Average life.** Result of a survey of 14 of the latest type plugs installed in the Ghost showed an average life of 306 hours and average number of starts per plug of 139.

• **Severe erosion.** Plug life is determined by erosion of semi-conducting material at the electrode. Manufacturers are currently testing a plug with a completely flat discharge end. This is expected to reduce considerably the erosion problem. Plugs now in use on the Comet have a somewhat curved discharge end.

• **Flameout.** No inflight flameouts have been experienced, according to BOAC, except those deliberately done by overfueling extinction during tests of the fuel or electrical systems to gain experience of conditions which might arise. Relights were accomplished without difficulty within the 25,000 ft. altitude range of the equipment. (Rolls-Royce's H. E. West noted that the igniter's 15-mm. flashover was supposedly good to 50,000 ft.) Three cases of failure to relight were reported during training flights. These were believed to result from attempting relight at too high airspeeds where the mixture was too lean.

▶ **Plug Problems**—Original plugs were susceptible to failure at the ground electrode. If broken, the ground electrode was blown through the turbine, possibly causing damage to the buckets. Cure was to make electrodes shorter and stiffer.

Reason for the severe erosion of the semi-conductor at the electrode tip was thought to be kerosene penetrating behind the conductor, with subsequent gasing causing the conductive material to break away. Appreciable improvement in plug life was achieved by hermetically sealing joints between the semi-conducting material and the center stem.

Other ignition problems encountered were:

• **Lead leakage.** Earlier type of ignition leads were considered to be dangerous because of risk of sparking between

(Advertisement)

Lockheed

Super Constellation Sales Lead

Super Constellation sales for the first half of 1953 gave Lockheed a midyear backlog of nearly $150,000,000 in commercial aircraft—a new record. As a result, more Super Constellations are on order and more dollar backlog confirmed than for any other commercial transport of this type in the world.

Lockheed's transport production line is now at a higher peak of activity than at any time in Constellation history, and on the basis of hard cash on the counter the Super Constellation has proved itself the most popular single transport in the world today.

All Orders Are on Schedule

Lockheed production this year will approximate $765,000,000 in commercial and military planes—topping the record for the entire industry for any prewar year. In spite of this tremendous output of 12 different types of aircraft, every single production order is on schedule both in California and at the Marietta, Georgia, plant.

Lockheed News Briefs

A newly formed group of Lockheed engineering scientists will devote full time to the study of aviation trends 10 to 25 years from now.

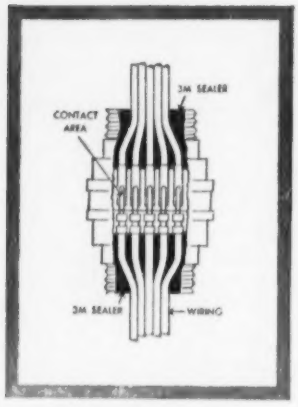
The Navy's big Lockheed P2V patrol plane will now have a tremendous extra burst of speed for quick getaway in enemy waters. When used for anti-submarine warfare, 2 jet engines will be slung under the wings in quick-detachable pods, giving added thrust to its twin turbo-compound engines. Now experimental, but being considered for wide-scale use on the versatile P2V Neptune.

Military interest is high in the recent operations of turbo-compound Super Constellations as early-warning picket planes for the U. S. Air Force as well as the Navy. U.S.A.F. designation is RC-121C, Navy is WV-2. Each carries 6 tons of latest electronics equipment, accommodates a crew of 31. Gives the U. S. high-flying radar stations that will extend our warning system far beyond the horizon limits of surface radar.

A new Lockheed-developed leak-proof fuel-line coupling is now being installed in Lockheed jet aircraft. Provides greater safety against leakage, is only 20% the weight of former types.

Lockheed engineers have produced a new automatic ejection seat making possible a more fully guided catapult stroke and saving space by compacting the seat and its accessory equipment.

Lockheed has produced and delivered its 25,000th airplane.



Keeping your power dry!

Protecting our shores from invasion is only one of the jobs assigned to Navy aircraft. Another task, equally important, is for the plane to protect itself against its own "natural" enemies.

For instance, consider the possible effects of salt air and water, of moisture condensation, of vibration on the electric wiring that delivers power throughout the plane. How quickly these elements would destroy the aircraft—if not checked.

To help protect these power lines, 3M, working with McDonnell engineers and the U.S. Navy, developed EC-1120PC—a potting compound, not affected by vibration, that provides a permanent seal for wiring in plugs against moisture and salt air. It helps to keep your power dry!

See what adhesives can do for you . . .

Like to know more about EC-1120PC . . . or other 3M products designed expressly for aircraft use? Then, by all means, call in your 3M salesman, or write in for your free copy of our 12-page aircraft booklet. Address your request to 3M, Dept. 1110, 411 Piquette Ave., Detroit 2, Michigan.

3M COMPANY

ADHESIVES • COATINGS • SEALERS
for the Aviation Industry

MINNESOTA MINING AND MANUFACTURING COMPANY
ADHESIVES AND COATINGS DIVISION • 411 Piquette Ave., Detroit 2, Michigan
GENERAL SALES OFFICES: ST. PAUL 6, MINN. • EXPORT: 122 E. 42 ST., N.Y. 17, N.Y. • CANADA: LONDON, ONT.

MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

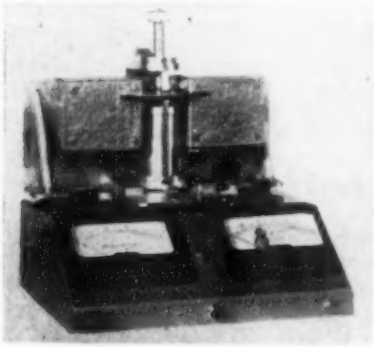
outer shield and ground (condenser effect). Remedy was wrapping Lassovic tape over the entire length of the lead, which gave gave good results.

• **Mount failure.** Rubber shock mounts supporting the ignition boxes (mounted in Zone No. 1) fail rather frequently as a result of high ambient temperatures.

▶ **Conclusion**—Proving flights of the Comet started in March 1951. Engines were then equipped with the Lucas torch igniters. Starting fuel was piped in separately via a solenoid shutoff valve and a reducing valve to a spark plug energized by a booster coil. After the equipment's low-altitude relight limitation was determined, high-energy ignition equipment was installed by May 1952.

Current ignition equipment for the Ghost Mk. 50 includes two British Thomson-Houston high-energy igniter units (Model C1CTS1) and two Lodge igniter plugs (Type 2773R1) at No. 5 and 7 combustion chambers.

Fuel is kerosene to specification D.Eng.R.D.2482. Wide cut gasolines are not used.



Tester Evaluates Bearing Torque

A rapid-responding torque tester for ball bearings, which compares breakaway, starting and running torque, and evaluates race roughness and dirt in precision bearings, is offered by Baker Co., Inc.

In the testing operation, one control enables the operator to raise the voltage on an eddy current motor until it starts the bearing. At this point a reading on the meter gives comparative measure of starting torque, while a steady state running torque is indicated at reduced voltage.

On another meter, at a selected speed, amplified signals generated by race roughness and dirt indicate bearing quality.

Price of the unit is $800 f.o.b. manufacturer. Availability is said to be 12 weeks.

Baker Co., Inc., Maplewood, Me.

NEW AIRCRAFT SERVO COMPONENT

The Type 71-5 Baroresistor is a pressure actuated potentiometer designed for operational use in aircraft. It features:

HERMETICALLY SEALED MECHANISM

The potentiometer winding and operating parts are hermetically sealed in a vacuum. Pressure is applied inside the bellows only. Therefore, the Type 71-5 Baroresistor is not affected by dust, fungi, or moisture.

RUGGEDIZED CONSTRUCTION

A special high force mechanism was developed for the Trans-Sonics Baroresistor to avoid the necessity for employing micro force potentiometer elements. Shock of 30g in any direction will not cause electrical discontinuity.

MACHINE CALIBRATION

Each instrument is calibrated by machine and its performance is automatically recorded as a graph of resistance versus pressure. Every turn of the winding is inspected. All electrical characteristics are automatically checked in an eleven stage inspection cycle.

TECHNICAL REPRESENTATIVES

Los Angeles, Calif. Telephone: Cumberland 3-4183
Dayton, O. Telephone: Hemlock 1254
San Carlos, Calif. Telephone Lytel 3-2189
Seattle, Wash. Telephone: Main 7006
St. Louis, Mo. Telephone: Sweetbriar 2175
Houston, Tex. Telephone: Monroe 5-5624
Detroit, Mich. Telephone: Broadway 3-2900
Cleveland, O. Telephone: Yellowstone 2-7840
Boston, Mass. Telephone Capitol 7-9797
Home Office Telephone Lexington 9-2800

Condensed Data

Range: 0-15 psi, absolute
Resistance: 7500 ohms
Maximum voltage: 75 volts
Resolution: 1/5%
Accuracy: 2% of full scale

Typical Applications

Servos—Vary servo loop gain as a function of altitude.
Computers—Voltage divider, P total/P static.
Fire Control—Air density measurements.
Telemetering—Pressure transducer.
Recording—Pressure transducer.

Write for Bulletin No. 71-5 for further details

Price: $225.00 Short delivery

TRANS SONICS, INC.

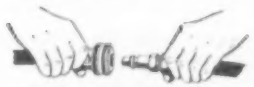
7 Forest Street, Bedford, Mass.

HANSEN

PUSH-TITE COUPLINGS

TRADE MARK

For Quick Connection—Instant Automatic Flow or Shut-Off



To connect Coupling, merely push plug into Socket. Pawls set at 45° angle securely hold plug, yet permit complete swiveling action.

To disconnect Plug, pull back sleeve. This unlocks Socket and Plug—automatically seals Socket end of line.

Minutes saved are hours gained with Hansen Quick-Connective Couplings—every time you change air tools—whenever you connect or disconnect a gas, liquid, or grease line. Available in a wide range of sizes and fittings. Also two-way shut-off and straight-through Couplings.

WRITE FOR CATALOG

REPRESENTATIVES: Baltimore • Birmingham • Buffalo • Chicago • Cleveland Dallas • Dayton • Denver • Detroit • Ft. Wayne • Hartford • Kansas City Los Angeles • Louisville • Milwaukee • Minneapolis • Newark • New Orleans Philadelphia • Pittsburgh • San Francisco • Savannah • Seattle • St. Louis Montreal • Toronto • Vancouver ◆ **EXPORT DEPARTMENT:** Cleveland

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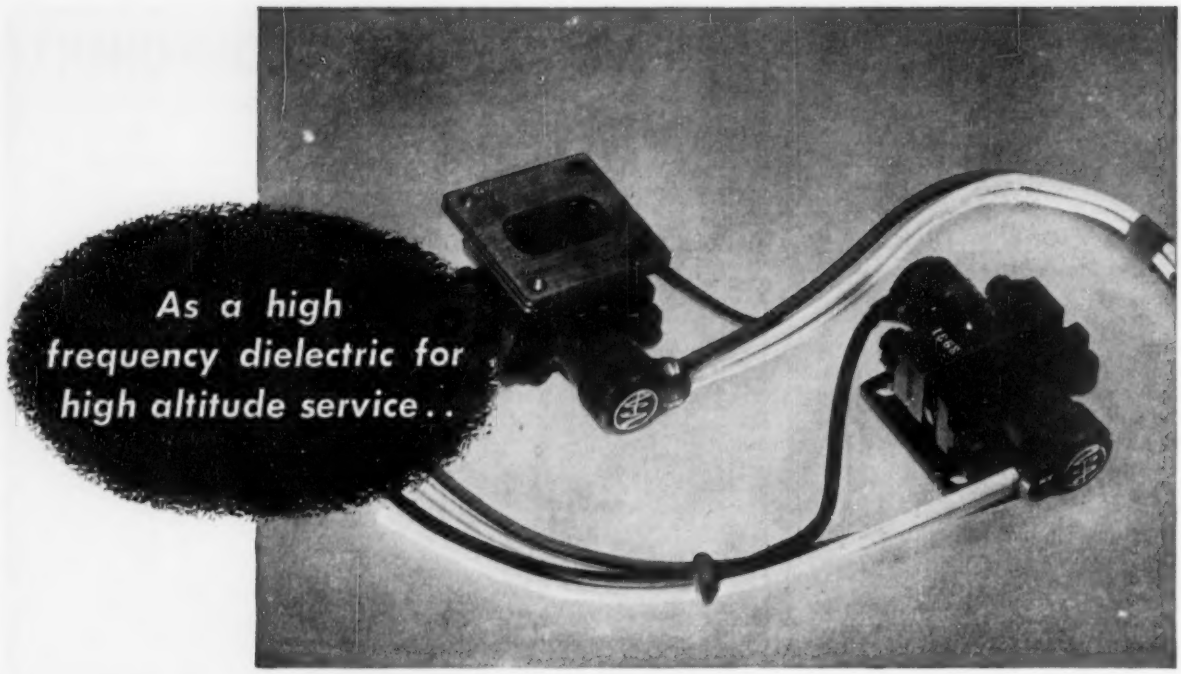
4031 WEST 150th STREET • CLEVELAND 11, OHIO



SILASTIC works

where other materials fail!

The klystron tube is the heart of a modern beacon or airborne radar system. However, today's experimental aircraft and guided missiles reach altitudes as high as 80,000 feet, where air pressure drops off to a near-vacuum. Corona problems increase permitting short circuits and possible flashover to develop at the klystron's cathode and reflector connections. Humidity intensifies the problem, while the tube itself reaches surface temperatures as high as 150°C.

One way to maintain frequency stability is to enclose the tube in a heavy and space-consuming pressure system. Varian Associates, of Palo Alto, California, one of the world's largest manufacturers of klystrons, accomplishes the same effect by molding Silastic* around the connections and lead wires. Flexible, light-weight and no larger than the tube itself, the Silastic withstands high operating temperatures and mechanical abuse. Moisture is sealed out and corona trouble is entirely eliminated.

The remarkable resistance of Silastic to corona discharge is confirmed by severe laboratory tests. In one test, for instance, lengths of 5mm Silastic and organic rubber-covered ignition cables were coiled around glass rods and wrapped with copper screen. A full 14,000 volts was applied continuously between the screen and conductor. Within 30 minutes the organic cable broke down from corona cutting, as illustrated (inset). The Silastic was still unaffected after 12,000 hours.

That's the kind of performance that makes Silastic, the Dow Corning silicone rubber, unique among rubbery materials. When you need excellent dielectric properties in a rubbery material that retains its resilience at temperatures as high as 500°F and as low as —130°F, ***Specify Silastic.***

* T.M.REG.U.S.PAT.OFF.

MAIL COUPON Today! *for data on the properties of Silastic*

DOW CORNING CORPORATION, Dept. D-10, Midland, Michigan

Please send me:

- ☐ Silastic Facts 10a, properties and applications of Silastic stocks and pastes.
- ☐ List of Silastic Fabricators.
- ☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

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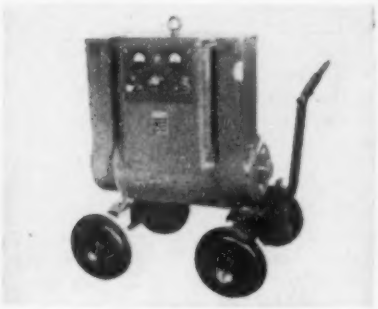
NEW AVIATION PRODUCTS



Generator Gives Jet Engines Variable-Voltage Power

Jet engines receive constant-current, variable-voltage electric power with a new motor generator set being offered by Motor Generator Corp., Hobart Brothers Affiliate.

Known as model 925 aircraft energizer, the unit is designed for jet engines equipped with variable voltage electric starters. Rated at 500 amp. 28.5 v., d.c. continuously, set is also said to supply 700 amp. for three minutes, or 1,000 amp. for one minute intermittent duty.

Unit has a compound-wound type, direct current generator with interpoles and separate (inbuilt) excitation. On a common shaft is a 25 h.p. 220-440 v., three-phase, 60-cycle squirrel cage induction motor operating at 1750 r.p.m.

A monitor top houses motor and generator controls and instruments, with protective controls provided for both the aircraft and motor generator set.

Motor Generator Corp., Hobart Brothers Affiliate, Hobart Rd., Troy, Ohio.

Vacuum Gauge and Switch Make 5-Position Monitor

Hastings Instrument Co. announces that its vacuum gauge is now available with a switching unit which enables it to monitor as many as five positions in a vacuum system with the single gauge.

One-knob switching permits use of a

When PERFORMANCE is of utmost importance specify KOHLER Precision Controls.

Shown is a fuel dump valve made for Westinghouse Electric Corporation for its new, powerful engine used in the McDonnell Navy F2H-2 Banshee illustrated above. The valve's function is to release fuel from the fuel line, eliminating fire hazard while the plane is landing. To insure top PERFORMANCE Kohler has facilities to cast and machine the aluminum body and the stainless steel components, to finish, inspect, assemble and test the valve for shipment on the required dates.

Call on us to either develop a valve for your particular requirement or to manufacture one to specifications.

Kohler Co., Kohler, Wisconsin. Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS

Waterproof! switch

new CPI basic snap-action

METAL ACTUATING BUTTON

METAL SWITCH CASING

SILICONE, NEOPRENE, or VINYL CASING

SINE CURVE SNAP-ACTION ELEMENT

Normally Closed STATIONARY CONTACT

Normally Open STATIONARY CONTACT

Features complete sealing from effects of water, dirt and oils • Vibration resistant up to 240 g's • No resonance up to 7000 C.P.S. • Will take 2000 ft. lbs. shock test • Rated 10 amperes resistive 28 V. D.C. or 115 A.C. • Actuators made to fit individual requirements • Silicone, neoprene or vinyl molded cases • Wire leads from 6 inches to 48 inches optional

CONTROL PRODUCTS • INC

328 SUSSEX STREET • HARRISON • NEW JERSEY

Manufacturers of Thermal Devices and Waterproof Switches

single operator. Hastings states that this will permit processing plants or laboratories to economically establish permanent multiple joint monitoring systems for measurements in the low micron range.

The unit is said to be practical for widely separated indications because calibration is not affected by length of cable from indicator to gauge tubes. Continuous readings may be made without affecting pressure in system.

The gauge is protected from outgasing, system contamination and corrosion by noble metal thermocouples and the use of nickel-plated gauge tubes. Calibration of gauge tubes reportedly is not affected by exposure to atmospheric pressure or change in ambient temperature.

Hastings Instrument Co., Inc., Hampton, Va.

New Accumulator's Seal Seals Better, Lasts Longer

Parker Aircraft Co. has come up with a new type of cylindrical hydraulic accumulator.

Designed for aircraft installations involving pressures up to 3,000 psi., the unit comes in both single- and double-shell construction. Parker reports that the design conforms to MS 28700, and that its accumulators meet all requirements of MIL-A-5498, including gunfire and low temperature, pre-charge leakage test.

Accumulators are available in sizes ranging from 12¼-in. overall, 2½-in. cylinder and 8⅛-in. stroke (weight, 3.8 lb.) to 33⅜-in. overall, 4½ in. cylinder and 27⅞-in. stroke (weight, 29.5 lb.). Nominal total oil volumes range from 25 through 400 cubic in. (isothermal).

The double-shell model of the new accumulator has a pressure-balanced inner cylinder. This makes possible long seal life, thin-walled cylinders and safe reaction to gunfire, Parker reports.

Pressure balancing is accomplished by providing an air space (between the outer shell and inner cylinder) connected to the air side of the cylinder, so that air pressure can be applied equally on both sides of the cylinder wall. Normal air pressure in the air chamber is approximately one-third the working hydraulic pressure. This enables the cylinder to maintain the exact

You get ALL these Features when you buy PET Drills!

Reserve Power—for the extra-tough job. Powerful, Continuous-Duty Motors—built in PET's own factory. Dynamically Balanced Armatures—for freedom from vibration.
Six Heavy-Duty Ball and Needle Bearings.
Compact Design—makes hard-to-reach drilling jobs easier and faster.
Aluminum-Alloy Die Castings—for light weight, easy handling.
Forced Ventilation—for cool running.
Precision-Cut, Heat-Treated Gears—for smooth, quiet power flow.

If you want the *best* for your maintenance or production work, take an extra look at the PET Superduty Drill shown here. Check its features! Here's a drill that's made for heavy, continuous duty... with *plus* power per pound . . . built to *work* right and *handle* right on the job.

Normally you might expect to pay extra for such features—in the form of "optionals" that jack up your cost. But that's not true of PET Drills! All these features are standard in the PET Superduty line . . . *and they're available to you at a standard drill price!* That's why the coupon below can save money for you. For free catalog and name of your nearest PET distributor, *mail it today!*

NOW...you can get the RIGHT DRILL for YOUR job!

PET Superduty Drills are available in 54 distinct models and 3 capacities: ¼", ⅜" and ½". Your choice of pistol or saw-type grip. With such a broad line, you don't have to compromise on a drill that's "almost" right! You can choose *exactly* the drill you need for your job. The PET Superduty line includes drills meeting U. S. Government and military specifications.

PET® POWER TOOLS

Plus Power per Pound

PORTABLE ELECTRIC TOOLS, INC.

320 West 83rd Street, Chicago 20, Illinois

In Canada: Portable Electric Tools, Ltd., 452 Birchmount Road, Toronto 13, Ontario, Canada

MAIL COUPON FOR FULL INFORMATION

PORTABLE ELECTRIC TOOLS, INC. AW-103
320 W. 83rd St., Chicago 20, Ill.

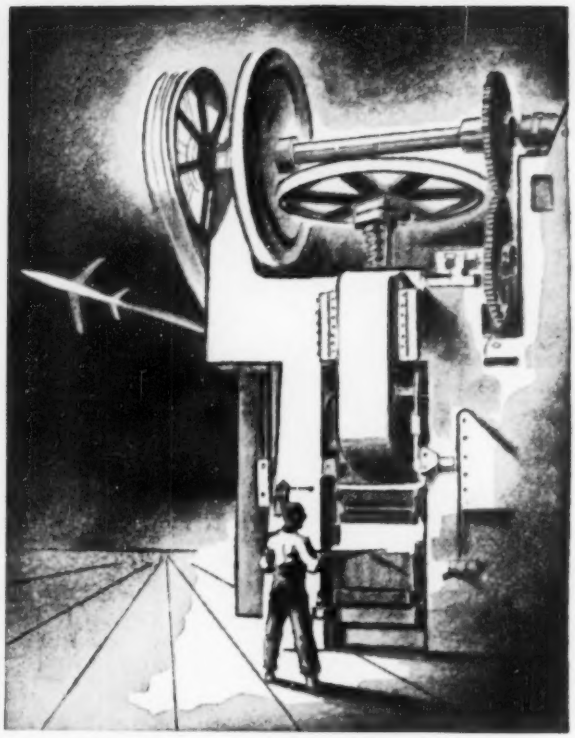
Gentlemen: Please send us free copy of your PET Superduty catalog, and name of nearest distributor.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____



FORGING COMES OF AGE...JET AGE!

From horse-shoe to jet engine blade is an air-age away. Both are forged – but there the similarity ends. For UTICA's new methods of forging, with giant new machines and a world of new forging knowledge, combine to ring out results that would leave an old-style smithy gasping.

All the advantages of forging – at accuracies of a few thousandths!

Today's forging brings out the toughness, the strength of the metal – concentrates the strength where it's needed – yet ends with a finished part within a few thousandths of final size. Drastically reduces machining time and cost. Gives you a part that's minimum weight and dependable as only forgings can be! More than that, with UTICA's precise quality control system, you get accurately forged pieces by the thousands!

UTICA forging techniques for both "old" and "new" metals.

Today, as for many years, UTICA forges are producing our own fine alloy steel pliers and adjustable wrenches. And, with new techniques – many of them pioneered here – we are forging jet engine blades and other critical parts from the new, hard-to-handle metals. Perhaps we can help you – with small, precise forgings for defense today . . . with forgings for new products tomorrow.

Jobs available for technically trained personnel.

Our new "File Facts on Precision Forgings" outlines UTICA's methods and facilities for precision forging, now totally engaged in jet blade production, but ultimately generally available.

PRECISION····

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TRADE MARK

····FORGINGS

UTICA DROP FORGE & TOOL CORPORATION

UTICA 4, NEW YORK

MAKERS OF THE FAMOUS UTICA LINE OF DROP FORGED PLIERS AND ADJUSTABLE WRENCHES

same diameter over its entire length without the "breathing" or distortion normally accompanying pressure changes, Parker says, eliminating a major cause of leakage.

In the event of explosive shocks, such as gunfire, in the area of the accumulator, the compressible air "cushion" between the outer shell and inner cylinder reduces peak pressures. Double shell construction permits immediate release of air when outer shell is punctured, the company points out.

A further advantage listed for pressure balancing is that it also serves to alleviate the problem of heat reduction in aircraft. The air space gives the double shell construction a considerably larger surface for heat dissipation.

The accumulator's piston is free floating. It rides on two O-rings, one on each end of the piston, and does not contact the cylinder wall. The company accomplished this by using AN standard O rings fitted into new type grooves.

Warning vents and end caps are integral parts of the accumulator design. The warning vents consist of drilled passages in the accumulator end caps which serve to warn of existing air or fluid pressure within the unit. Passages are so arranged that when an end cap is partially removed, either air or fluid will escape through the passages if internal pressures have not been completely relieved.

End caps are forged and internally threaded, giving maximum strength. Being on the outside of the cylinder, they also give support to cylinder walls in case of extreme shock pressures.

Parker Aircraft Co., 5827 West Century Blvd., Los Angeles 45, Calif.

Portable Work Platform Is Erected Quickly

A new portable hydraulic platform developed by Scaffold Equipment Co. can be erected from its eight components in 15 minutes. It is designed

Cut nut-running time 75%

Snap-on* Electric IMPACT WRENCH

The fastest wrench you can put in the hands of a maintenance or production worker. Swiftly runs nuts or screws on or off—cuts costs—makes tough jobs easy. The Snap-on impact wrench delivers up to 2,000 powerful rotary blows a minute without twist or hammer shock to operator. Sets nuts solidly, or quickly reverses to break tough ones loose. ½" square drive takes sockets ⅜" to 1 1/16"—many accessory tools available. 2 models—115 volts, 220/230 volts. Available through Snap-on factory branch warehouses in principal industrial centers. Write for Snap-on Industrial catalog and new catalog of 4,000 hand and bench tools for production and service.

SNAP-ON TOOLS CORPORATION
8020-J 28th Ave., Kenosha, Wis.

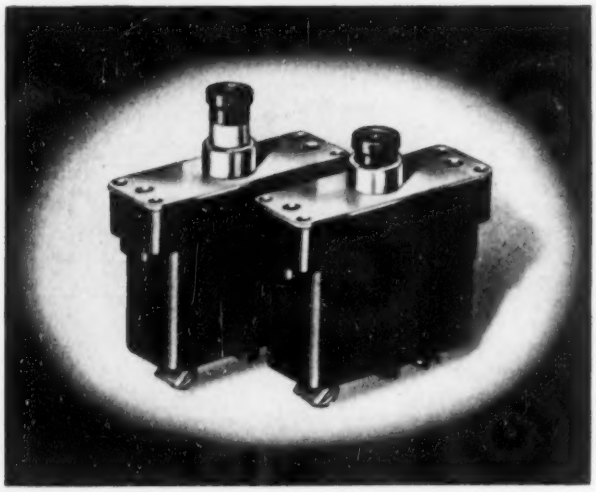
*Snap-on is the trademark of Snap-on Tools Corporation.

PROTECTION PERFORMANCE Assured

First and Foremost

KLIXON CIRCUIT BREAKERS

are Precision Built for Positive Protection



For Instance, take the D6752

- HIGH RUPTURE CAPACITY—Has successfully ruptured a 30-volt D.C.circuit adjusted for 6000 amperes at a pressure equivalent to 50,000 feet.
- CYCLING LIFE — Has withstood over 10,000 manual cycles with load.
- TRIP-FREE — Trip-free through the entire range of overloads.
- PRECISION CALIBRATION — 100% individually tested for ultimate trip characteristics while attached to leads of proper size cable and mounted on test boards which simulate actual aircraft installation.
- OVERLOAD CHECK — 100% inspected for 200% load tripping time characteristics.
- CORROSION, HUMIDITY, DUST RESISTANT — Withstands 100-hour exposure to salt spray, 15-day humidity, and sand and dust tests as required in MIL specifications.
- Write for specification data on the Klixon D6752 and other Klixon Circuit Breakers.

SPENCER THERMOSTAT
Division of Metals & Controls Corporation
2810 FOREST ST., ATTLEBORO, MASS.

KLIXON

to do any job within a fraction of an inch of the level desired.

The manufacturer states that unit will hold up to 2,000 lb. over an 18 sq. ft. deck area. Construction is all steel, made from special carbon steel tubing.

Lift on the unit consists of either a 3-ft. or 5-ft. hydraulic ram, and a Power-Pak hand pump. It may be elevated at rate of 2 ft./min. and lowered within seconds.

Mobility for the platform is provided by either 5-in. or 8-in. rubber tire brake lock casters. Removable hand guard rails are furnished for safety. As an added safety feature, Scaffold has provided thumb screw safety locks on all legs to lock the platform at any level.

Units are available in three standard sizes: 3½ ft. adjustable to 6½ ft., 7 ft. adjustable to 12 ft., and 12½ ft. adjustable to 17½ ft.

Scaffold Equipment Co., P.O. Box 8786, Pittsburgh 21, Pa.

ALSO ON THE MARKET

Fire retardant wall paint pours out carbon dioxide and calcium chloride to smother fire and retard spread of flame on the surface. It is applied by brush or spray on runways, hangars and public buildings. It reportedly has passed federal specifications and U.S. Engineers' tests. Known as Fyr-Kote, paint has been listed by Underwriters Laboratories and carries Underwriters' label on can.—Fyr-Kote Co., division of Morris Paint & Varnish Co., 27th & Douglas St., Omaha, Neb.

Non-hygroscopic flux is offered as solution to aluminum joining corrosion problems. Called Eutector flux 190NC, it is said to lower surface tension, provide greatly improved wettability and completely eliminate corrosion caused by absorption of water from the atmosphere. Reportedly cleans the joint by removing surface oxides, acts as automatic heat indicator (melting of flux indicates approximate joining heat), and promotes smoother and faster flow of alloy—Eutectic Welding Alloys Corp., 172nd St. & Northern Blvd., Flushing 58, N. Y.

Tempered steel drill for drilling hardened steel has three wide lands to keep it from floating. Oversize holes are reportedly eliminated due to the greater bearing surface of the wide lands. Heavy center section protects against drill breakage. According to the manufacturer, any standard drill press can be used on hardened parts with this unit by simply inserting drill in the chuck and adjusting the belt for proper speed.—Tempered Steel Drill Co., 3610 Superior Ave., Cleveland.

BARBER COLMAN

Aircraft Controls

. . . chosen to maintain

cabin comfort in new DC-7

Flagships of American Airlines

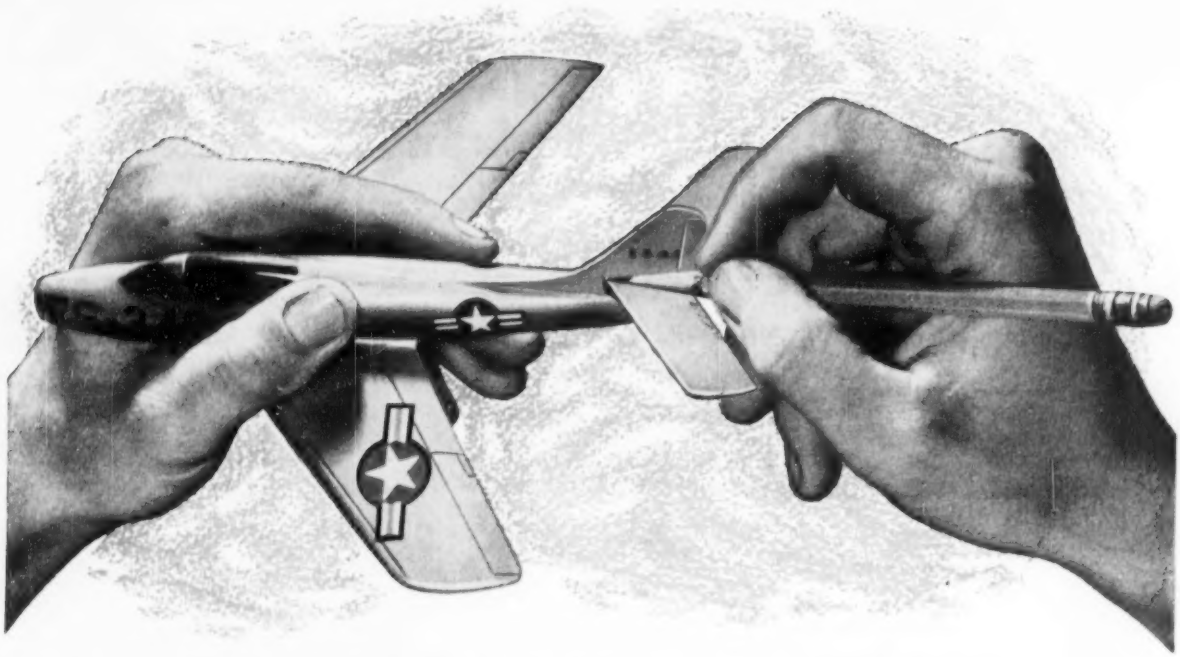
Coast-to-coast non-stop . . . in eight hours! That's the service American Airlines will soon inaugurate with its new fleet of DC-7 Flagships. And every mile of the way between California and New York, American's DC-7 passengers will fly in complete air-conditioned pressurized comfort. To constantly provide the correct temperature for DC-7 passengers and crew, American again selects the Barber-Colman automatic temperature control system, just as it has previously for their DC-6, DC-6B, and Convair Flagships. Helping develop this system to meet the needs of these new DC-7s is another example of how Barber-Colman engineers team up with the industry's leaders to bring about ever finer service for the traveling public.

PASSENGER COMFORT automatically assured as stewardess sets control for exact temperature desired in new American DC-7 Flagship.

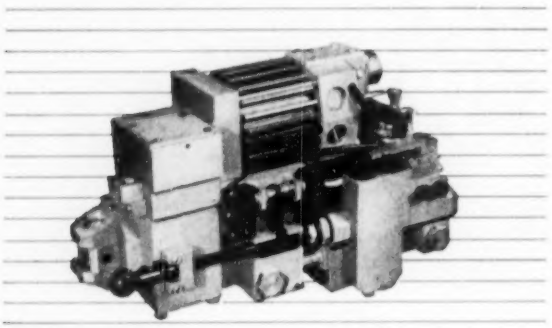
The Barber-Colman line of aircraft controls includes: Actuators; Valves; Positioning Controls; Temperature Controls; Small Motors; Ultra-Sensitive Relays; Thermo-Sensitive Elements. Engineering sales offices in Los Angeles, Seattle, Chicago, Baltimore, New York, Montreal.

BARBER-COLMAN COMPANY, DEPT. J, 1428 ROCK ST., ROCKFORD, ILLINOIS

OVERdoors and Operators • Automatic Controls • Industrial Instruments
Air Distribution Products • Aircraft Controls • Small Motors • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery



AEROPRODUCTS ACTUATORS RELIEVE DESIGN PROBLEMS



Aeroproducts self-locking actuators . . . by providing instantaneous adjustment of variable surfaces to any position within their designed range . . . have eliminated many previous restrictions in aircraft design. Without pre-selection or positioning, these new actuators permit variable surfaces to be locked in position and held until changed by the pilot.

Any combination of systems—hydraulic, pneumatic, electric or manual—can serve as the primary power source. These actuators can be synchronized readily in tandem or in series to provide coordinated control of related movements.

Announced uses of Aeroproducts self-locking actuators include control of the "flyable tail" of the new Republic F84F "Thunderstreak" jet fighter, the horizontal stabilizer on another high-speed jet fighter, and the afterburner of a jet engine. Additional applications include control of wing flaps, dive brakes, bomb bay or cargo doors, gun turrets, variable wing sweep and incidence, wing fold and canopy slides.

Building for today
Designing for tomorrow

GM GENERAL MOTORS

Aeroproducts

ALLISON DIVISION • GENERAL MOTORS CORPORATION
DAYTON, OHIO

Aviation Stock Option Plans

This Company . . .	Authorized Options on This Number of Shares . . .	(Which Is This Percentage of Outstanding Shares Prior to the Plan . . .)	To These Employes . . .	At This Price . . .	On This Date
American[1]	250,000	3.87%	Officers	$11.70	9-26-50
American[1]	210,000	3.25	Employes	12.50	6-18-52
Bell[1]	25,000	5.71	Employes	(3)	1-23-52
Boeing[1]	100,000	9.21	Officers	(3)	4-22-52
Convair[1]	80,302	3.46	Executives	10.50	4-21-50
Douglas[1]	30,000	5.00	13 Officers	99.00	4-18-51
Eastern	100,000	4.6	Employes	13.50	10-7-50
Lockheed[1]	33,875	3.07	Officers	22.00	11-20-50
Lockheed[1]	27,000	1.18	Officers	19.35	10-23-51
Martin[1]	200,000	10.74	Officers	(4)	9-23-52
Republic	11,000	1.10	Officers	8.79	6-15-50
Solar[1]	45,270	10.00	Officers	(2)	10-15-51
Sperry[1]	200,000	9.84	Employes	(2)	4-26-51

1. Source: Stock Ownership Plans for Employes, New York Stock Exchange.
2. Not less than 95% of market price at the time option is granted.
3. Fixed by committee or board of directors.
4. Closing price on day option is granted.

Options: For the Few or Many?

Airlines use them broadly, as general morale builders; manufacturers see them as incentives for top people.

Should stock option plans be used solely as a means of attracting and rewarding top levels of management, or should they be extended over a broader base as a general morale builder?

Both viewpoints are represented in a New York Stock Exchange compilation, in which aviation firms figure prominently, of stock ownership plans.

Most of the plans are premised on options granted to top management, with benefits confined to officers and key employes. However, in a number of instances, especially in the air transport group, a broader base has been sought. This group has demonstrated a more progressive approach than the aircraft manufacturers in attempting to make stock ownership plans available to wider segments among its employes.

▶ **Why Stock Options?**—Real impetus to stock option plans stems from the special tax treatment written into Revenue Act of 1950 passed by Congress.

This special tax provision permits officers to buy shares in their own companies under favorable circumstances in order to provide greater incentives to management. Because of heavy income taxes, even large salaries frequently fail to afford adequate net compensation, according to a number of officials.

Under the approved stock option form, a device is available permitting option recipients to acquire a considerable stake in their companies. As a practical matter, these options are used to achieve capital gains and as such are not subject to heavy personal income tax imposts.

▶ **Qualifications**—To qualify for this special tax treatment, the option price must be at least 95% of the market at the time the option is granted. Other limitations stipulate that stock cannot be sold for at least two years after the option is granted and must be held for at least six months after the option is exercised in order to establish a capital gain.

The widespread use of the stock option plan throughout American industry is an indication of its acceptance as an integral element in corporate practice. The current New York Stock Exchange study reveals this trend in the magnitude of companies in diversified industries following this practice and in its report presents examples of various plans as disclosed by listing applications since 1950. The accompanying table lists aviation stock option plans. (A number of aviation companies have share purchase programs and are not included in the table.)

▶ **Favor the Few**—It would appear that aircraft companies have been much quicker to grant stock options to management than the airlines. Also, a common characteristic of most aircraft option plans is to favor a few officials.

• Douglas Aircraft Co. affords an inter-

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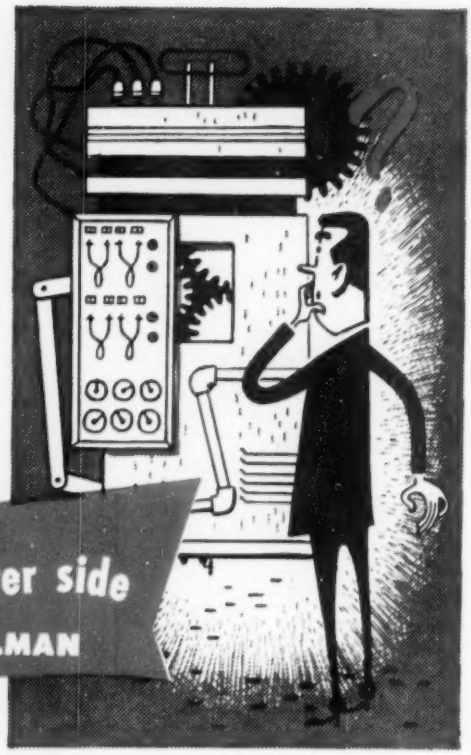
The washer shuts itself off
Then starts itself anew

The car's a Mushomatic Eight
Remote controlled by knee
And who's in charge of all
this stuff?
Unautomatic me!



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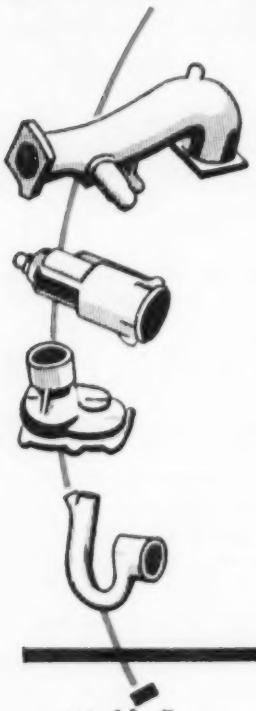
on the lighter side
by WELLMAN



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esting example. The company's listing statement indicated that 13 officials would benefit. Actually, eight individuals participated. The original award was for options on 30,000 shares at $99.00 per share. Following a two-for-one stock split, these options were adjusted to a call on 60,000 shares at $49.50 per share. The president of Douglas Aircraft now holds options on 40,000 shares. At present market prices, his options show an unrealized appreciation of approximately $750,000. This gain is by far the greatest for any individual among the plans shown.

• **Convair** made available a profitable plan to nine of its executive officers on Jan. 28, 1950. Most of these individuals have since left the company. They enjoyed a call on 33,000 shares of stock at $10.50 per share and were able to acquire this equity over a period of time through a stock-purchase plan with indebtedness to the company in the form of non-interest bearing notes. A later plan made 80,302 shares available, also at $10.50.

• **Republic Aviation** plan granted six top officers the right to purchase a total of 11,000 shares of its stock at an average price of $8.7865, June 15, 1950. At present market quotations, a material appreciation has accrued to the option holders.

▶ **Broader Base**—The airlines have spread their options over a broader area.

• **Eastern Air Lines** was the first air carrier to make options available to its employes under the Revenue Act of 1950. It also showed the way in having a broad base for participating in the plan. Eastern's program made stock options available on 100,000 shares to all employes who had been in the service of the company for three years or longer. Options on about 85,000 shares were exercised by about 4,000 employes. No director, including the president of the company, was permitted to participate in this particular plan. The purchase price was established at $13.50 per share. (Current quotation is about $23 a share.) Late last year, all of the stock so optioned was paid for and taken up by its subscribers. Payments were made through regular payroll deductions.

• **American Airlines** also effected a broad distribution in its stock purchase program for employes. Initially, a total of 250,000 shares were made available to officers at an option price of $11.70 per share in September 1950. In June 1952, an additional 210,000 shares were offered under a share acquisition program for a much broader group of employes at $12.50 per share.

• **United Air Lines** recently launched a stock purchase plan for its employes. Under this arrangement, all regular employes who have been in the service of the company one year or more are eligible to participate. Each employe elect-

ing to acquire stock in United through this program will make payment through payroll deductions of not less than $5.00 nor more than $100.00 per month. To these payments, United will contribute 15% toward the stock purchase fund. The aggregate stock purchase deductions from employes cannot exceed $1,500,000 annually. The 15% contributions by United provide added encouragement to stock ownership by employes. Further, through group purchases, material savings in commissions are effected and a systematic means of stock accumulation in the company by small investors is made possible. An integral element of this plan and many like it is that it facilitates a sense of proprietorship which can prove to be an important morale builder.

► **All-Around Benefit**—In the past, criticism has frequently appeared as to the award of options on a too liberal basis and out of proportion to role of the recipient officials in the success of the companies involved. On the whole, however, there is an increasing awareness that where equitable distributions prevail and are applied within the confines of reasonableness, the stock option principle has led to progressive management results and benefited the stockholders.

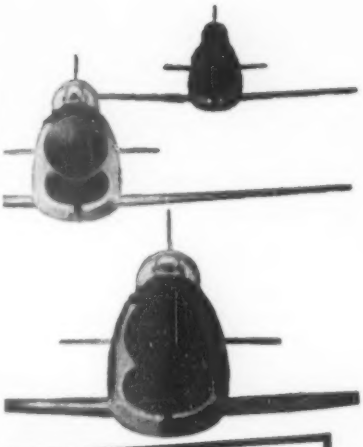
—Selig Altschul

BH

fabricators for the aircraft industry

B.H. AIRCRAFT CO. INC.

FARMINGDALE, NEW YORK



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The Engineering Department which designed the **Sabre** and other headline-making military airplanes has openings for engineers—experienced in aircraft, recent engineering grads, or men from other fields with adaptable experience. Long-term military projects and twenty-five years of continuous expansion underwrite your future at North American. Current openings in:

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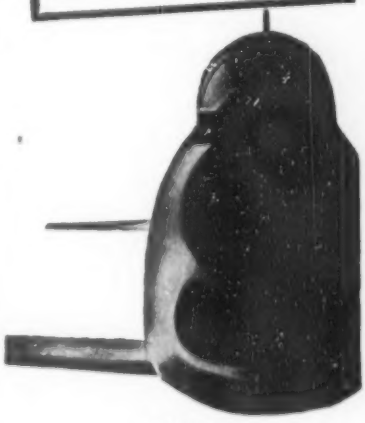
Specialists in all major aircraft fields

Liberal travel and moving allowances



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North American Aviation, Inc.

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LOS ANGELES 45, CALIFORNIA
or
COLUMBUS 16, OHIO

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GLOBAL

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NAVIGATION...

another Sperry first... 1919

Man tested his wings over the Atlantic for the first time May 16, 1919 when the U. S. Navy Flying Boat NC-4 began its historic 11-day trip to Lisbon. Aboard were Sperry instruments to aid in navigation—and Sperry instruments have played a vital role in global navigation ever since.

Since the Sperry Turn Indicator and Drift Set of that early flight have come the major navigational aids of our times—the Gyro-Horizon, Directional Gyro, Gyrosyn® Compass, Automatic Pilot, and Automatic Approach Control—electronic Sperry "brains" so precise and so dependable that global navigation today is largely routine. And yet, Sperry engineers are not satisfied. From Sperry developments now under way may soon come a new form of global navigation—navigation, which by comparison will dwarf Sperry's present achievements!

1947 First "pushbutton" flight across the Atlantic by the USAF All-Weather Flying Division. Douglas C-54, with Sperry Gyropilot and Automatic Approach Control, made trip both ways including take-offs and landings without human hands touching the controls.

1924 First round-the-world flight by Army required 175 days. The two Douglas World Cruisers, Chicago and New Orleans, were each equipped with a Sperry Master Compass.

1932 First woman to fly the Atlantic solo was Amelia Earhart. Her Lockheed Vega was equipped with Sperry Gyro-Horizon and Directional Gyro and made the trip in 14 hours and 54 minutes.

1953 Air Force bombers, like the Boeing B-47B, depend on Sperry Bombing Navigational Computer to complete their global missions. Last year aboard commercial airliners other Sperry navigational equipment helped 2,362,000 trans-ocean passengers to reach their destination safely. You'll find Sperry too in the cockpits of the long-range jet transports of the future.

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DIVISION OF THE SPERRY CORPORATION
GREAT NECK, NEW YORK

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M.I.T. GRADUATE. Age 29, desires executive position in engineering or in its allied fields. Has excellent personality and experience in experimental and production design and design management. Prefers the East. Available immediately. PW-9245, Aviation Week.

SALES ENGINEER long experience, wide circle friends all aircraft companies. Presently employed as Sales Engineer aircraft component. Wishes to make change. Can travel continuously, abroad. Long time pilot. Can fly plane if available. Good mechanic. Can supply references on demand. PW-9246, Aviation Week.

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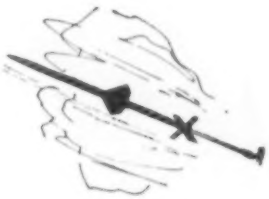

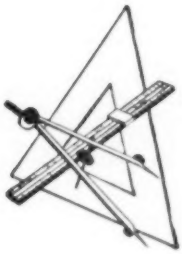

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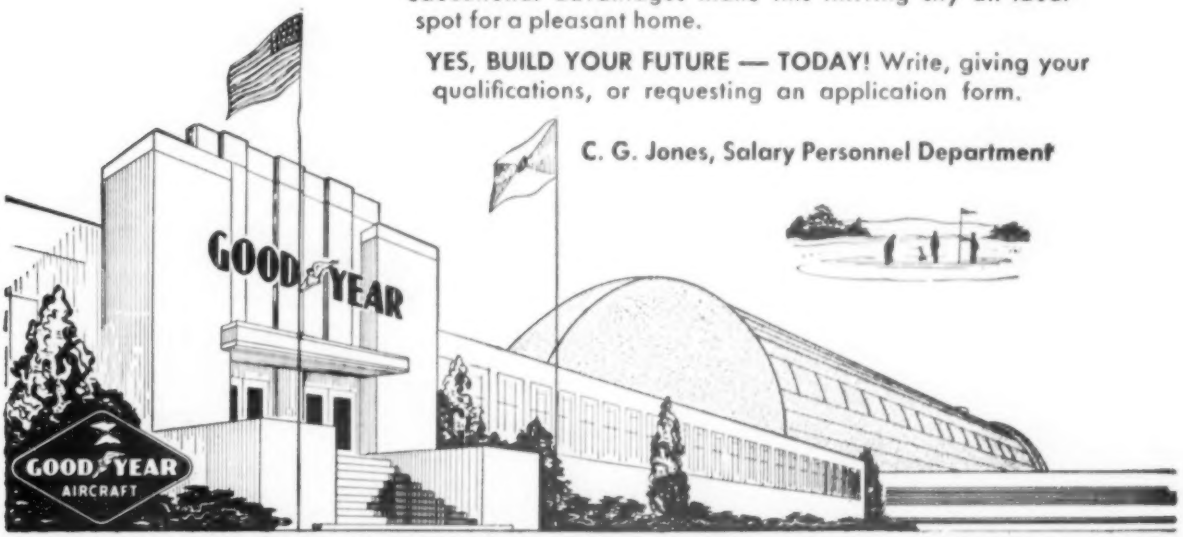

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P-9411, Aviation Week
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P-9214, Aviation Week
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Applicants should have experience as an engineering specialist in a large design organization. Job requirements include engineering degree plus eight to ten years' experience in various aircraft armament fields, such as aircraft guns, ammunition chutes, ammunition feeders (including related pneumatics) and rockets (including pack design).

All inquiries will be held confidential. For further consideration submit letter of application to:

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15	22101-11-A4	Eclipse	Pressure Trans.
9	20100-42B-14A2	Eclipse	Torque Ind.
9	20000-8A-14	Eclipse	Magnesyn Pos. Ind.
23	20100-11C-4-A1	Eclipse	Wing Flap Indicator
11	DW-33	Eclipse	Transformer
80	DW-28	Eclipse	Transformer
11	2227-11-D3A	Eclipse	Tachometer
75	1416-12E	Eclipse	Starter
100	716-3A	Eclipse	Generator (NEA-3A)
384	564-2A	Eclipse	Oil Separator
71	828TY13Z2	Weston	Oil Temp. Indicator
40	119862	Weston	Carb. Air Temp. Indicato
400	AN5780-2	Weston	Wheel & Flap Position Indicator
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40	828TY12Z2	Weston	Dual Carb. Temp. Gauge
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85	727TY72Z2	Weston	Air Temp. Gauge
88	727TY73Z2	Weston	Air Temp. Gauge
83	727TY74Z2	Weston	Air Temp. Gauge
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33	DW-47	Eclipse	Transformer
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185	981280	Kidde	CO2 Cylinders
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104	966679	Kidde	Pressure Control
225	981591	Kidde	Tee
151	A-4614	Kidde	Switch
47	M870036B	Kidde	CO2 Cyl.
74	923748	Kidde	Oxygen Cyl.
326	982585	Kidde	Valve
325	AN60009-1B	Oh. Chem.	Valve
247	AN6009-2A	Oh. Chem.	Valve
47	2-1046-76	Parker	Valve (3000 PSI)
115	P4CA2A	Parker	Primer
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105	SP4-2746-78	Parker	Restrictor Valve
68	6-746-10	Parker	Valve
40	SP4-2746-79	Parker	Restrictor Valve
48	SP-2746-80	Parker	Restrictor Valve
60	SP4-2746-81	Parker	Restrictor Valve
127	PL2-2546-75	Parker	Cone Check Valve
123	PL2-2546-76	Parker	Cone Check Valve
620	PL2-2546-77	Parker	Cone Check Valve
540	PL2-2546-78	Parker	Cone Check Valve
142	SP4-2746-76	Parker	Restrictor Valve
112	PLY-843-54	Parker	Check Valve
23	PL2-1846-77	Parker	Check Valve
120	MF9-713-15A	Vickers	Hydraulic Pump
124	PF12-713-25BCE	Vickers	Hydraulic Pump
327	PF4-713-20BCE	Vickers	Hydraulic Pump
43	MF45-3911-20Z	Vickers	Hydraulic Pump (3000 PSI)
28	AA31400	Vickers	Valve
125	D7818	Adel	Anti-icer Pump
17	AN4014	Erie Meter	Wobble (D-3) Pump
70	AN3213-1	Scintilla	Ignition Switch
250	A-9 (94-3226)	Nesco	Ignition Switch
66	M862A	Jos. Pollack	Master Switch
148	PG208AS1	Honeywell	Switch Air Ram.
40	PG208AS7	Honeywell	Air Ram Switch
18	4582-AA-6C	Dynamic Air Eng.	Blower
24	U-702-15	Joy Mfg. Co.	Blower

Quan.	Part No.	Mfg.	Description
20	V301B7	Aerotec	Pressure Relief Valve
419	450	Skinner	Filter
287	1033-4E1	White-Rodgers	Heater Control Switch
126	17322-2	Fenwall	Thermo Switch
34	9804B	Vapor Car Heating Co.	Control Box
25	46B311	Vapor Car Heating Co.	Compesnator
202	A812	Interstate Aircraft & Eng. Co.	Solenoid
46	146102	Bendix	Valve (0-500 PSI)
240	1965-900	Airex	Relief Valve
29	HC2109	Air Associates	Hyd. Cylinder
8	HC2110	Air Associates	Hyd. Cylinder
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Coleman	Control
230	921-8	Stewart-Warner	Heater (200000 BTU)
30	0655-D	Aro	Oxygen Regulator
65	ASDC2	CO2 Mfg. Co.	Fire Detector
97	6041-H-146A	Cutler Hammer	Relay (B-12)
237	6141-H69A	Cutelr Hammer	Circuit Breaker
47	7264-404	Leach	Relay
22	M-2031	Air Associates	Actuator
11	FYLD2516	Barber-Coleman	Thermostat
51	AYLZ2284	Barber-Coleman	Micropositioner
20	72400	Ham. Stand.	Prop. Reversing Control
10	5X18	Woodward	Governor
46	A14-A-9708P	Westinghouse	Contractor
26	70G3	G.E.	Transformer
718	82A	Square D	Relay
6	83A9	Surface Combustion Co	Heater
115	C6363-1-5A	Spencer	Circuit Breaker
115	C6363-1-2A	Spencer	Circuit Breaker
33	18784	Adel	Restrictor Valve
1700	AM1614-80	Heinemann	Circuit Breaker
31	BO6X-2	Allied	Relay
85	12924-2	Adel	Lock Valve
805	58G926	G.E.	Ballast Core & Coil
140	58G946	G.E.	Ballast
40	7210-24	Leach	Relay
66	25432	Airesearch	Flex. Cable
518	MT48C	Bendix Radio	Insulator
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52	715E	Fulton Syphon	Temp. Control
478	D9530	Adel	Selector Valve
668	D9530-2	Adel	Selector Valve
428	D9560-2	Adel	Selector Valve
179	D9632	Adel	Selector Valve
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744	D10044	Adel	Selector Valve
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814	74247 (TY, PH3)	Aero Supply	Valve
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74	AN5830-6	Whittaker	Valve
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130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
1888	K1593-6D	Kohler	Valve
500	NF3-5	Mallory	Noise Filter
20	TA-12B	Bendix Radio	Transmitter
35	RA10-DB	Bendix Radio	Receiver
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775	AN3096-5	Grimes	Dome Light
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236	PR48-A1	Stromberg	Carbureator
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19	1375F	Holley	Carbureator
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8288	P & W	Follower Ass'y.
814	3M814	P & W	Blower Ass'y.
53	48362	P & W	Shaft
75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing

Quan.	Part No.	Mfg.	Description
77	84591C	P & W	Nose Housing
200	84350-D	P & W	Crankcase Ass'y
281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
350	G31502-A	Guardian	Relay
22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
88	3135-11C	Eclipse	Pressure Switch
32	3V-917-HC	Pesco	Separator
100	27314	Purolator	Oil Filter
128	3801-3B	Eclipse	Fuel Quan. Gauge
33	490313	Wright Aero	Pump Ass'y.
46	416421	Wright Aero	Drive Ass'y.
76	U635A (AN4000-2B)	U.A.P.	Fuel Strainer
12	U8416-MM	U.A.P.	Oil Cooler Ass'y.
25	26675	Airesearch	Motor
35	AA14002A	Vickers	Accumulator
21	FD65-5	Diehl	Motor
81	3616	Bendix Radio	Control
23	3620	Bendix Radio	Station Box
335	G1 (94-32376)	G.E.	Oxygen Pressure Signal Ass'y.
180	AW-CV-1-1	U.S. Gauge	Check Valve
740	1C-200	G.E.	Radio Noise Filter
15	1EAR-280BH	Pesco	Pump
7	SP-1-445-8	Parker	Selector Valve
8	1E621	Pesco	Pump
29	NEP-2	Eclipse	Auxiliary Power Unit
16	LER-30D	Lawrence	Auxiliary Power Unit
4	2CM46A2	G.E.	Generator
6	2P248EB	Pesco	Fuel Pump
21	2E258SA	Pesco	Pump
146	AW2-3/4-25K	U. S. Gauge	Manifold Press Gauge(Metric)
27363	CREB3N	Casco	Rod End
18	SA/3A	Kidd	Impact Switch
13	3GBD1A18A	G.E.	Regulator
18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro Switch	Switch
2094	PM-5	Spencer	Circuit Breaker
44	5BA25D-J4B	G.E.	Motor
31	5AM31JJ9A	G.E.	Amplidyne
111	5AM31NJ10	G.E.	Amplidyne
425	5BA40NJ1A	G.E.	Motor
189	5DP65-MB1	G.E.	Motor
25790	NR6L12	Torrington	Bearing
26	M549A	Bendix Radio	Antenna Switch
45	D2060	C. P. Clare	Relay
298	727-TY37P	Weston	Air Temp. Ind.
2000	8909-K99	C. H.	Switch
2747	NAF310310-4B	Cannon	Plug
402	NAF310310-5B	Cannon	Plug
20	#15701-R	Pioneer	Trim Tab Controller
8	#47114-D2.0-20	Giannini	Pressure Transmitter
126	35801-3	Koehler	Shut Off
57	#1300-20	Transicoil	Servo Motor
114	AV1B1174	General Control	Magnetic Valves
11	G1098D	Minn. Honeywell	Tank Unit
3	415A	Hewlett Packard	Standing Wave Indicator
327	JAN 6AL5		Tube
959	NF10084		Radio Noise Filter
36	FM-1		Q.E.C. Unit
17	PY4M (B24)		Q.E.C. Unit
8	G16A2CA21	Minn. Honeywell	Pressuretrol
1865	73-A-01		Throttling valve

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440	-C4	637	-C13	114	-C25
411	-C6	7742	-C20	102	-C38
8211	-CH6A	316	AN5-C7A	246	-C41
173	-C7	2543	-C7	185	AN6-C7
457	AN4-C4	1531	-CH7	179	-C14A
516	-CH6	2578	-CH7A	460	AN7-C21A
8714	-C7	185	-C11A	194	AN8-C15
80	-C10A				

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(My Commission expires March 30, 1954)

A Long Look Ahead

BY THE McGRAW-HILL DEPT. OF ECONOMICS

First of a Series of Six Articles on Air Transport Markets in the Next Ten Years

THE CHANGING ECONOMY

The U. S. economy is beginning a major transition that will profoundly affect the transportation industries during the next five to ten years. There's more to this than just a recession or "readjustment" after the end of the defense boom. Whenever this "bump" or "slump" is over, we're likely to find ourselves in a different kind of business world.

What sort of economy can we look forward to in the later 1950s? Will it be like the roaring '20s, the stagnant '30s, or the hectic '40s with their aftermath of cold war and inflation? Probably, like none of these periods. The most important change—if current trends in Moscow and Washington are any indication—is that it will be a *more peaceful* economy. We'll probably maintain a fair-sized munitions industry, at least on a stand-by basis. And you can bet that the military will still be spending heavily on research and experimental production. But relatively, defense activities will play a much smaller part than they do now. We can probably expect less inflation and fewer business fluctuations of the type caused by war or fear of war.

In a decade of peaceful development, what will be the dominant trends? Here are some suggestions on which the economic forecasters seem to be pretty well agreed:

1) A GROWING ECONOMY. In the next ten years, population may increase 15% or more, and national income almost 20%. Many industries will grow faster than this. The U. S. Dept. of Commerce has compiled a list of 23 that are growing at least 7.5% per year. Business isn't as likely to increase in spurts—the way it did after Korea. But over the long term, growth will be substantial.

2) A LEISURE ECONOMY. Mechanization is boosting output so rapidly that hours of work seem sure to be cut as the years go by. Output per manhour is rising 2% per year on the average. At that rate, we'll just have to take it easier to avoid over-production. Some forecasters expect a 38-hour average work-week by 1960. There'll be longer vacations, too, and more paid holidays.

Another way that leisure will increase is through earlier and more frequent retirements. And it's possible that young people will delay longer before joining the work force. The demand for education and recreation by these younger and older age groups—as well as part-time recreation for the worker off the job—seems sure to increase greatly.

3) A LUXURY ECONOMY. The great growth industries of the next decade will not be those that produce armaments or capital goods—or those that produce everyday items that make up the essentials of living. America today is better equipped with new plant and equipment (including military plant and equipment) than at any time in the past. And the American consumer is better equipped than ever, so far as ordinary things go—his house, car, clothes, etc.

But we are probably on the verge of a tremendous increase in living standards, where the ordinary man buys out-of-the-ordinary things. According to the National Planning Assn., this is a trend that means "the luxuries of yesterday become the necessities of today."

The reason, once again, is increasing productivity. High output not only means more leisure. With less need for arms and capital equipment, our industrial plant will be able to turn out tremendous quantities of consumer goods —for example, sailboats, private planes, or hi-fi radios. What are now luxuries can become mass production items. And the rising national income will provide the purchasing power for this increasing quantity of luxury products.

Travel, of course, is a luxury to most people. So is leisure at home. Saving is really a luxury—and a great variety of goods come under this heading. How people will use their increased time and higher incomes—to travel, to buy things for the home, or just to sit—remains a question. But they will be able to choose between these things with a freedom that has not existed in an era where incomes just about held their own with living costs. This brings us to our next point:

4) A COMPETITIVE ECONOMY. Buying power will be tremendous. But the increase in things offered for sale will be tremendous, too. Companies selling such necessities as food and clothing can still count on a market growing in step with the population. But in the whole range of optional consumption, the consumer is going to be tempted as never before by a bewildering variety of ways to spend his dollar. The New York secretary may take a trip to Arizona—but only after she decides not to join the beach club, or buy the color TV set or some other attractive gadget not yet invented.

5) AN ECONOMY OF INNOVATION. Research is producing a tremendous rate of turnover in both industrial and consumer products. Improvements in quality and variety will continue to widen the consumer's choice of products and to complicate the problem of maintaining markets for established goods and services.

Where will the transportation industries—and specifically the air transport industry—fit into this picture? Like other service industries, they will find themselves in a rapidly growing economy which offers more potential customers than seemed possible a few years ago. This new American market will be made up of an increasing population, with increasing income and leisure to spend—and an enormous appetite for good ways to spend them. But competition from other forms of consumer spending will be keen. And the share of the consumer dollar that goes for travel—by air, or by competing means—will depend, in the last analysis, on how attractive travel can be made for the new mass market.

Future articles in this series will discuss the major factors affecting air travel in the changing economy: population changes; income changes; leisure time; changes in business travel; relationship between air travel and general business activity.

PAL Boosts DC-3 Seating, Cuts Fares

Philippine Air Lines is enlarging three 26-seat DC-3s to basic 40-passenger interiors that can be converted to combination transports carrying 32 persons plus freight.

PAL spokesmen say the new configuration will allow a 40% reduction in fares on domestic, inter-island routes, paving the way for an increase in air carrier traffic.

▶ **Pint-Sized Passengers**—Larger seating arrangements were touched off by a comprehensive study made by the airline of its market, which gave these average weights for Filipinos:

- Adult male, 143 lb.
- Adult female, 112 lb.
- Child, 48 lb.

These light weights plus the Filipino's relatively small bone structure made feasible PAL's plan to use 25-lb. double Burns seats in a four-across, 10-row layout.

▶ **Fleet Conversion**—The carrier will test passenger reaction to the new interior when its three transports begin operating in the islands Dec. 1.

If the configuration is accepted, the carrier probably will change its entire 26-plane fleet of DC-3s to accommodate more passengers.

▶ **Quick Change**—The new layout calls for quick conversion (two manhours) of the basic interior to a passenger-cargo plane by removing the two forward rows of seats.

Aluminum tubing stanchions supporting nylon webbing will separate the DC-3's freight loads from the passenger cabin.

TAIL-TOP CAMERA

Camera that took United Air Lines' new film, "World in a Week—California," is faired into the leading edge of UAL DC-6B stabilizer. Unusual action and panoramic shots were caught for the carrier's promotional 16-mm. color motion picture, just released by United. Holding the Cine-Kodak Special is Ed McGlone, who produced the motion picture for United with his partner, Ted Cate (right). UAL engineer Kirt Miller looks over the camera housing. In the photo at left, Miller and Cate inspect the more conventional belly-mounted camera rig, while McGlone adjusts a sighter that duplicates field covered by the Cine-Kodak Special. The Hollywood motion picture producer rode in the DC-6B's cockpit during filming of UAL's new movie and used the sighter as a guide while he directed shots from the tail and belly cameras. McGlone controlled shots made during the transport's aerial tour of California by triggering the camera through an electronic device from the DC-6B's cockpit.

Bolivia, Ecuador Bid For More Air Traffic

Two South American republics are constructing new airports and improving old fields to attract more international air traffic. The countries also are trying to build up their airline systems.

▶ **Airport Program**—Ecuador is modernizing two airports at Quito and Guayaquil. Pedro Carbo Mediana, Minister of Public Works, has sent airport plans to the Export Import Bank for consideration and approval. Runways are to be extended and modernized and new buildings constructed at the old fields.

In Bolivia, Indian farm laborers are building an airport near the town of Cliza, which in good weather will be adequate to handle DC-3s. The strip is named for Walter Lehm, general manager of the Lloyd Aereo Boliviano.

At Copacabana, Bolivia initial work has begun on another airstrip. Preliminary work has started on an administration building for the field.

▶ **Carrier Buildup**—The Argentine airline, Aerolineas Argentinas, has conducted DC-4 survey flights from Santa Cruz, Bolivia, to Lima, Peru, to determine the possibilities of such a route.

The Bolivian government is studying a plant to export minerals and other raw materials needed in France in exchange for spare engines and aircraft parts. This probably is the first instance where international barter has been used to assist in maintaining a national airline.

LAB, the Bolivian airline, recently revised its schedules to include 1,400 flying hr. a month, compared to 1,300 last June. During the same period, the airline increased its aircraft utilization from 2.9 to 3.4 hr. per day.

Lower Airline Profits Forecast for 1954

Airlines earnings next year probably will fall below the peaks expected in 1953, Standard & Poor's, business advisory organization, forecasts from a current analysis.

"Absence of the abnormal stimulus of the Korean war points to an easing of standard-fare traffic in 1954," the service says, "although further expansion of discount service will at least provide good support."

Operating margins after depreciation apparently will continue to narrow because of rising depreciation charges and other costs, Standard & Poor's concludes, and the recent narrowing of profit margins so far shows no sign of abating.

Contributing factors are expenses of new plant integration still to be incurred by many airlines and the scheduled sharp rise in depreciation.

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EXECUTIVE OFFICES:
3171 South Bundy Dr., Los Angeles 34, California

CAB ORDERS

(Sept. 28-Oct. 4)

GRANTED:

North Central Airlines special permission to fly one roundtrip per day between Chicago and Duluth via Milwaukee, Green Bay and Rhinelander, Wisc., and Ironwood Mich., and suspend service between Madison and Rapids-Stevens, Wis.

Panagra permission for free transport of a special tour Oct. 1 from several South American cities to U. S. cities.

Trans World Airlines temporary trans-Atlantic mail rate increase proposed by CAB Sept. 16. Previous temporary rate was lower than the non-subsidy compensatory rate. Permanent rate, with subsidy, will be set soon.

Freight Forwarders Institute right to intervene in Board's investigation of indirect air carriage of property (freight forwarder regulation investigation).

Trans-Texas Airways exemption to serve Lufkin and Houston, Tex., on flights between Shreveport, La., and Houston.

Frontier Airlines authority to omit evening flight to Monte Vista, Colo., until night facilities become adequate but continue serving it with one roundtrip per day.

APPROVED:

Bristol Bay Airlines contract to operate Pacific Northern's bush mail routes.

Pan American World Airways assistant vice president W. Waldo Lynch's interlocking relationships as director of Aeronautical Radio, Inc., International Aeradio (Caribbean) and Hamlyn Electronics Corp.

POSTPONED:

Central Air Lines Dallas-Oklahoma route award pending Continental Air Lines attempt to have it stayed by Federal Court of Appeals.

DISMISSED:

Ozark Air Lines and its chairman, Barak Mattingly, request for approval of his interlocking directorship of American Transit Corp., holding intra-urban transit companies. CAB said it has no jurisdiction.

STARTED INVESTIGATING:

Pan American fare cut proposed on flights between Seattle and Juneau, Alaska. Pacific Northern complained, and CAB suspended the "proportional" fare.

DENIED:

Alaska Airlines request that PAA's Seattle-Alaskan route be placed "on the block" for sale or merger in the states-Alaska route renewal case, as are Pacific Northern and Alaska Airlines. CAB says "it must be recognized that Pan American holds a permanent certificate . . . and that the issue with respect to renewal of the . . . other three carriers (PNA, Alaska and Northwest) is before the Board because of their temporary nature."

Northern Consolidated and Alaska Airlines applications for new mail routes between major Alaskan points, including Fairbanks and Anchorage. Board granted addition of Nyac to NCA's routes.

THE AIR NEWS

REDS BID QUIT UN STALL!

Willy Urges U.S. Tell Reds Quit Or Face Music

Dulles Asks Soviet Use UN Seat To Ease Up East-West Tension

NEHRU DOUBTS IN WORLD PEACE

Ex-Red Tags Pal

POLICE FIND CAR OF ENVOY'S WIFE

Clark Guarantees All-POW Rights

U. S. Unveils Huge Base In Arctic Capable To House Atomic Bombers

Airline News Service Plans Expansion

Air Newspapers, Inc., publishers of news sheets distributed exclusively to airline passengers, will extend its activities to a transcontinental airline if president Philip J. Seavey's plans materialize.

Current distribution is to three East Coast airlines—Eastern, Colonial and Allegheny. EAL gets 60,000 copies a month, 29,000 each for the Eastern, Midwest and Northeast editions, called "The Air News." Colonial takes 10,000 copies of "The Air Post," Allegheny 10,000 of the "The Air Press."

Printed in the small tabloid form, Air Newspapers is serviced by International News Service. In addition to daily news roundups, the papers carry special features, some of them selected by the airlines.

Seavey says advertising revenue meets all publication costs. He describes "The Air News," which was started two years ago, as the first daily airline passenger newspaper ever printed in the United States.

CAB Charges Atlas Diverted NEA Profits

Civil Aeronautics Board's enforcement office has charged Floyd Odlum's Atlas Corp., Northeast Airlines and Consolidated Vultee Aircraft Corp. with diverting profits from the subsidized carrier.

Atlas, which controls Northeast and formerly controlled Convair, made $225,000 profit on the airline's sale of three Convair-Liners, CAB staff men claim.

Under Board rules and law, they charge, the deal should have been cleared through CAB.

If it had been, a Board official says, the alleged $225,000 profit might have been used to offset Northeast subsidy payments.

The airline originally ordered the planes from Convair. Northeast sold them, at cost, to Atlas Subsidiary Airfleets, Inc., which on the same day sold them to Alitalia at $225,000 profit, CAB charges. Thus, it is alleged, Atlas

HANDS-OFF LANDING

U. S. aviation executives discuss Britain's four-engine Handley Page Victor with Sir Frederick Handley Page (center) after the jet bomber demonstrated a hands-off automatic landing for the fourth International Aeronautical Conference. Flight for the joint RAES-IAS meeting took place at Radlett Aerodrome. British authorities claim the Victor is capable of making a perfect landing with the pilot's hands free of controls. Standing in front of the bomber's wing (left to right): Hugh L. Dryden, director of the National Advisory Committee for Aeronautics. T. P. Wright, president of Cornell Aeronautical Laboratory; Wellwood E. Beall, senior vice president of Boeing Airplane Co.; Sir Frederick; Preston R. Bassett, president of Sperry Gyroscope Co., and L. B. Richardson, senior vice president of General Dynamics Corp.

gained profit and Northeast did not.

The CAB enforcement office says that except for the original purchase, "None of the transactions and contracts . . . between Airfleets, Convair, Atlas and Northeast were submitted to the Board for approval."

This, it is charged, is a violation of the previous CAB order on Atlas' common control of Northeast and Convair, as well as Section 1005 (E) of the Civil Aeronautics Act.

CAB enforcement office asks the Board to require Atlas to sell its controlling interest in Northeast, and cease any further alleged violations of Civil Aeronautics Regulations and law.

New Jap Airlines Plan Local Service

(McGraw-Hill World News)

Five Japanese companies have applied to the government for licenses to begin local operations in an effort to break the present monopoly held by Japan Airlines.

The government is expected to act upon the applications sometime this month and choose two or three of the firms depending upon their technical ability, public need and safety capabilities.

The firms and their plans:

- **Aoki Airline:** Tokyo-Nagoya-Osaka once a day both ways with three Douglas DC-3s and one Beech twin-engine transport.
- **Japan Helicopter Transport:** Passenger service between Osaka-Iwakuni-Fukuoka and Osaka-Nagoya-Tokyo-Misawa-Sapporo once a day both ways and night services for mails and cargoes between Tokyo-Osaka once a day and night services for mails and cargoes between Tokyo-Osaka once a day both ways with two de Havilland Doves and three DH Herons.
- **Far Eastern Airline:** Toyko-Nagoya-Osaka-Iwakuni-Fukuoka once a day both ways for passengers and once a night for mails and cargoes with two de Havilland Doves and two Handley Page Marathons.
- **Yamato Airline:** Passenger service once a day both ways between Tokyo-Misawa-Sapporo; Tokyo-Nagoya-Osaka-Iwakuni-Fukuoka and cargo service once a day between Tokyo-Sapporo and Toyko-Nagoya-Osaka-Fukuoka with three Convair-Liners.
- **West Japan Airline:** Passenger service between Hiroshima-Osaka-Takamatsu-Beppu, Hiroshima, Beppu-Takamatsu-Osaka and Hiroshima, Beppu-Fukuoka with two Short Plymouth flying boats.

All these expect to set tariffs 10-20% lower than Japan Airlines. As soon as the government makes selection among the five, new services will be started within this year.

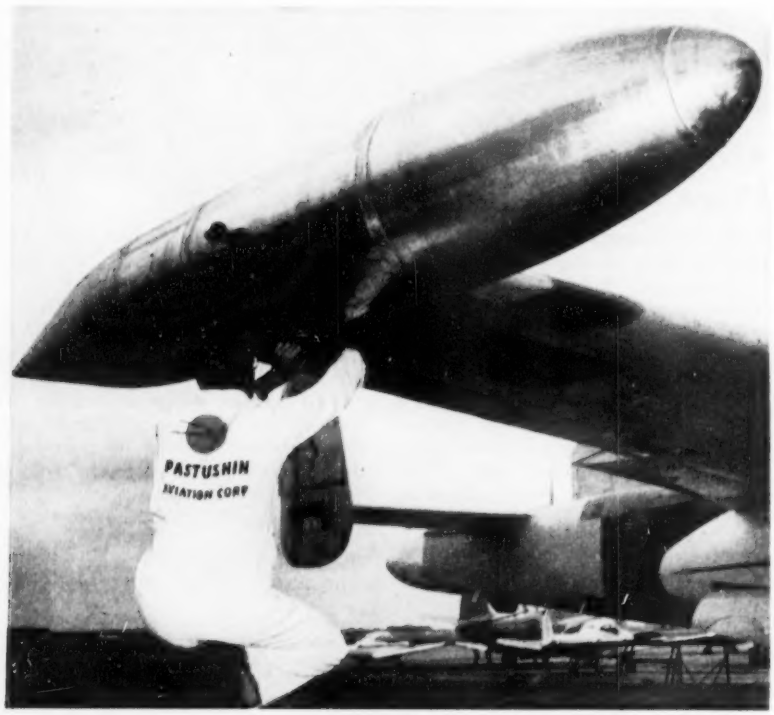
Fixed Routes Urged For Military Airlifts

Establishment of fixed air routes linking all major military installations is urged by L. R. Hackney, executive vice president of Transport Air Group, Inc.

The routes would be operated by private contractors, moving all military supplies that could be shipped economically by air, he told the Washington Aero Club.

Other points urged by Hackney to spur growth of the airfreight industry and build up the nation's airlift:

- **Permit airfreight** and airlift carriers to compete in the carriage of first-class mail by air.
- **Early decision** by Civil Aeronautics Board on certificates for international freight operations "which, in some cases, have been under consideration for over six years."
- **Creation** of a joint civil-military study group to further development of the contract airfreight and airlift carriers.
- **Improvement** in Air Force's warehousing and inventory methods, material handling, freight terminal facilities, and traffic management organization.



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BEA Plans Revival Of First-Class Flights

(McGraw-Hill World News)

London—Peter Masefield, chairman of British European Airways who pioneered tourist fares in Europe to the point where 97% of BEA flights today qualify for that classification, is taking a second look with a view toward a big revival of first-class service (AVIATION WEEK Oct. 5, p. 81).

This month a "luxury service" with turboprop Vickers Viscounts was inaugurated between London and Lisbon. Soon to follow will be first-class services between London and Nice, Belfast and Glasgow. By next summer, BEA says new first-class services will be operated "on more than a dozen different routes."

▶ **Higher Revenues**—Masefield's object: "to increase both revenue rate and load factors on an all-the-year-'round basis."

High summer peaks offset by very low winter slumps in BEA's traffic pattern have helped keep the corporation well in the red. This year's loss, $3.24 million, was only 7% less than last year's. First-class services—mostly in Viscounts limited to 40 passengers instead of the 47 capacity—are designed to attract year-'round air travelers, especially businessmen going to the continent.

▶ **Increased Traffic**—BEA's loss in 1952-53 remained substantial despite:

- **A 23% increase in passengers** carried: 1.4-million for the year.
- **A 12% boost in revenue miles** flown.
- **A cost-cutting program** that reduced the airline's break-even load factor from 73.2% to 69.9%.

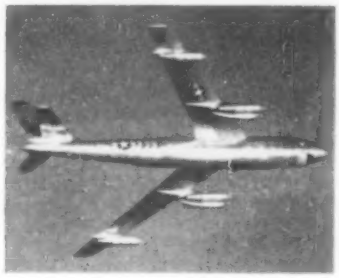
The corporation's revenue load factor recorded in 1952-53 was 62.9%.

▶ **Loss Factors**—The financial picture would have looked a lot better, the carrier says, if:

- **A fuel strike** in the U.S. last year had not caused cancelation of 1,554 BEA services. Estimated loss: $840,000.
- **BEA's mail pay** of about $1.19 per load ton-mile had been raised to BOAC's level of $1.47 per L.T.M. Estimated saving: $840,000.
- **The British government** didn't exact 33 cents in tax for every gallon of fuel. ("The fares of the first six passengers to board an average BEA flight are required to pay the fuel tax on an average flight.") If the tax were brought into line with that in other countries, BEA believes it would save $812,000.

Because none of these happened, the British taxpayer again will foot the bill.

▶ **Newest Fleet**—Next year, with the newest aircraft fleet in Europe in operation, BEA's prospect should look up. By the end of 1954, the carrier's fleet will consist of 26 Viscounts, 20 Elizabethans, 48 Pionairs and six de Havilland Rapide biplanes.



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Castleton-on-Hudson, New York

REPORT TO OUR ADVERTISERS . . .

Eight months of progress climaxed by the biggest issue and the biggest month in AVIATION WEEK history . . . a record 427.57 advertising pages for August 1953.

AVIATION WEEK believes that its advertisers—an audience that continues to grow substantially with each passing month—are due a progress report on their favorite magazine. In August, AVIATION WEEK compiled an all-time publishing record . . . a 454 page issue on August 17th . . . and the advertising total for the month was the biggest in Aeronautical publishing history. The August advertising figure, 427.57 pages, as well as AVIATION WEEK's eight months 1953 total of 2,344 advertising pages represents more space than the combined total of the next three Aviation publications. *With this whopping total AVIATION WEEK for the second year heads for that select group of young and old pros comprising the 25 largest consumer and business magazines in the nation. Heady stuff!*

This solid achievement *of AVIATION WEEK is further spelled out by its uninterrupted progress to record industry acceptance and advertising volume, a fact convincingly illustrated by its yearly advertising figures:* ***1950—1,680.92 pages, 1951—2,541.95 pages, 1952—3,248.07 pages, 1953—3,425 estimated pages.*** *With volume such as this, it becomes futile to speak of rate of growth comparisons. From 50 to 100 pages monthly represents a 100% gain, but the net result is something less than substantial in terms of industry potential. In publishing perspective, a gain from 225 to 250 advertising pages a month—a 7.7% gain—which on first inspection does not sound so impressive, is far more to be desired. Experienced buyers of magazine advertising space happily are in the know on this point as far as Aviation space is concerned. They pay little, if any attention, to such percentage comparisons. Long ago they marked them as deceptive and unreliable unless such claims were advanced where* **equal** *or* **near equal** *advertising volume was involved. In the Aeronautical field the advertising leadership of AVIATION WEEK has been unchallenged and uninterrupted for many years . . . year after year this publication has published more than the combined total of the next three publications.*

Advertising figures *such as these, however, tell only a partial story of AVIATION WEEK*

progress. Along with them go the expansion of our editorial services, with a staff now numbering 18 full-time editors, skilled Engineering and News specialists recognized throughout the industry. In the last eight months, in addition to their regular AVIATION WEEK writings, products of their talent have appeared in the SATURDAY EVENING POST, READERS DIGEST, HARPERS Magazine and on Major National Television Channels. Their achievements are ones in which we take considerable pride. They are an indication of the caliber of our staff. Supplementing their services are eight domestic News Bureaus, the services of Press, Inc., subsidiary of the Associated Press, Inc., foreign news offices in London, Paris, Frankfurt, Manila, Mexico City, Sao Paulo and Tokyo, and correspondents in the principal cities of the world.

This heavy concentration *of editorial talent and resources has resulted in the building of a reader preference unique in the business publication field. It is a record that has been exhaustively tested by the industry itself through their own reader preference studies. Of twenty-seven conducted through engineering and management departments, customer lists and directories AVIATION WEEK has won them all—and not closely but by a better than 4 to 1 average.* ***It is our standing offer to any manufacturer to conduct his own reader preference study, if he wants to get at the facts of reader preference and magazine pulling power.*** *We'll gladly pick up the check, if he desires. This record of reader preference has stood for years, increasing in momentum, and explains why when orders and inquiries of merit are wanted, AVIATION WEEK is always first at bat.*

Our growing audience *of AVIATION WEEK paid subscribers ($6.00 per year) continues to rise significantly. There are 10,000 more on the books since last year, making up a current total of over 45,000 net paid subscribers, (42,743, 6/30/53 ABC statement). Likewise our book-value rises importantly as indicated by our all-time high renewal percentage.*

These facts *and figures should serve in some small measure to make clear AVIATION WEEK's position among the powerful, independent publications of today. They are furnished to you with a deep sense of gratification because through you we were able to achieve them.*

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SHORTLINES

► **Allegheny Airlines** reports passenger revenues of $227,000 for August, highest monthly total in more than four years of operation.

► **American Airlines** will inaugurate daily roundtrip DC-6 tourist service to Mexico City, Dec. 13.

► **Braniff Airways** is cooperating with Delta Steamship Lines to offer winter tours to Latin America.

► **British European Airways** carried a record 217,377 passengers during July, earning $4,768,000 in revenue. This is 24% more than July 1952. . . . Airline is scheduling London-Copenhagen flight time at 1 hr. 40 min.

► **British Overseas Airways Corp.** has arranged for its associate, British Commonwealth Pacific Airlines, to operate scheduled services from Sydney, Australia, to Japan under charter to Qantas Empire Airways.

► **California Aeronautics Commission** reports that individuals and companies selling or promising to sell airline seats must file a $5,000 surety bond with the secretary of state in Sacramento. Excepted are airlines that file a sworn statement authorizing ticket brokers to act for them.

► **Capital Airlines** has opened a ticket office at New York's Idlewild International Airport.

► **Compania Cubana de Aviacion** has received its third Lockheed Constellation purchased to replace DC-4s.

► **De Haviland Aircraft Co.'s** jet Comet 2 made a London-Zurich flight in 78 min. just prior to its first proving flight from London to Rio de Janeiro Sept. 15 (AVIATION WEEK Sept. 28, p. 20).

► **Helicopter Air Service** fleet of seven Bell 47D copters has completed 25,022 hr. of accident-free flight time. Since start of operations Aug. 20, 1949, the Chicago copter line has flown more than 1,325,000 mi. with 12 million lb. of airmail and completed 96% of scheduled flights.

► **International Airlines** has begun weekly C-46 service between St. Petersburg, Fla., Bogota and Leticia, Colombia.

► **International Civil Aviation Organization** reports "far-reaching revision" of the Warsaw Convention has been recommended by its legal committee. A major amendment proposes raising the liability limit in case of bodily injury or death on international flights from $8,291 to $13,267.

► **KLM Royal Dutch Airlines** says passenger traffic increased 15% the first seven months this year. . . . Company will promote fall tourist travel throughout Europe by calling its enroute "stopover" privileges a "bonus" plan. Traveler to Amsterdam can visit Brussels and Paris and London or Scotland and Ireland without extra cost.

► **Japan Air Lines** is expanding its American staff preparatory to inaugurating DC-6B service between San Francisco and Tokyo.

► **Lake Central Airlines**—operating 20 flights daily in Indiana, Ohio, Illinois, Michigan and Pennsylvania—has increased its passenger revenue 63% since Apr. 1.

► **Minister of Civil Aviation** of Great Britain has approved Eagle Aviation's bid for an all-freight service on a London-Cologne-Munich-Zagreb-Belgrade route until Sept. 30, 1960, and BOAC's regular service between London-Dusseldorf-Rome-Beirut-Baghdad-Bahrein-Karachi-Delhi-Calcutta-Dacca until Apr. 3, 1954.

► **North Central Airlines** will re-inaugurate seasonal service to Land O' Lakes, Wis., next June, a service suspended since March 1951.

► **Northwest Orient Airlines** flew a total of 2,501,365 plane-miles in August, a 17% increase above the same period last year.

► **Pacific Southwest Airlines** added service to Long Beach, Calif., to its schedules Oct. 1. Company says it operates more scheduled coach flights within California than any other airline.

► **Scandinavian Airlines System** will operate eight trans-Atlantic flights a week in fall schedules, using 60-passenger DC-6 coaches and 34-passenger DC-6Bs.

► **Trans World Airlines** reports coach flights account for 45% of its 1,917,000,000 revenue passenger-miles flown the eight months ended Aug. 31. Total U. S. traffic gained 33%, international 20% this year, and still was increasing in August. . . . Company last week added two new all-cargo C-54s to commercial schedules, following release of the transports from Pacific airlift service.

► **United Air Lines** terminated Pacific airlift contract operations Oct. 1.

AVIATION CALENDAR

Oct. 13-15—Air Transport Assn.'s annual engineering and maintenance conference, Saxony Hotel, Miami Beach, Fla.

Oct. 14-15—Annual airport development and operation conference, sponsored by New York Department of Commerce, Onondaga Hotel, Syracuse, N. Y.

Oct. 14-16—American Institute of Electrical Engineers, sixth annual special conference on machine tools. Hotel Cleveland.

Oct. 15-16—Aircraft Electrical Society, 10th annual display meeting, Pan-Pacific Auditorium, Los Angeles.

Oct. 19-23—National Metal Exposition, Public Auditorium, Cleveland.

Oct. 21-23—National Metals Congress, City Auditorium, Cleveland.

Oct. 22-23—Radio Technical Commission for Aeronautics, 1953 fall assembly, Sheraton Park Hotel, Washington, D. C.

Oct. 23—National Advisory Committee for Aeronautics, annual meeting, Illinois University Institute of Technology, Champaign, Ill.

Oct. 23-24—Fourth annual National Noise Abatement Symposium, Armour Research Foundation of Illinois Institute of Technology, Chicago. Airplane and airport noise will be discussed by NACA's H. H. Hubbard.

Oct. 28-30—Southeastern Airport Managers Assn., annual convention, Marlin Beach Hotel, Ft. Lauderdale, Fla.

Oct. 29-30—National Business Aircraft Assn., sixth annual meeting and forum, Park Plaza Hotel, St. Louis.

Nov. 3-4—1953 Transport Aircraft Hydraulics Conference, sponsored by Vickers, Inc., Hotel Park Shelton, Detroit.

Nov. 4-6—Society of Automotive Engineers, meeting of Committee on Aircraft Hydraulic and Pneumatic Equipment, Statler Hotel, Washington, D. C.

Nov. 7—Air Education Day, sponsored by Junior Chamber of Commerce of Allentown, Pa., Allentown-Bethlehem-Easton Airport.

Nov. 16-17—American Society for Quality Control, conference of the Aircraft Technical Committee, Biltmore Hotel, Dayton, Ohio.

Nov. 17-18—Operations Research Society of America, first regular meeting, National Bureau of Standards, Washington, D. C.

Nov. 17-20—Aviation Distributors and Manufacturers Assn., 11th annual meeting, Jefferson Hotel, St. Louis.

Nov. 19-21—National Aviation Trades Assn. 14th annual convention, Hotel Broadview, Wichita.

Dec. 1-2—American Society of Mechanical Engineers, frequency response symposium, Hotel Statler, New York.

Dec. 17—Seventeenth Wright Brothers Lecture, U. S. Chamber of Commerce building, Washington, D. C.

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. Conference will be held concurrently at the Hotel Conrad Hilton.

Feb. 3-5—Society of Plastics Industry, ninth annual division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.

May 5-7—Third International Aviation Trade Show, sponsored by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—OCTOBER 12, 1953

A. C. SPARK PLUG DIV., G.M.C. 34
Agency—D. P. Brother & Co., Inc.
ADAMS RITE MFG. CO. 24
Agency—The Shaw Company
AERO INSTRUMENT CO. 48
AEROPRODUCTS DIV., G.M.C. 54
Agency—Campbell-Ewald Co.
AEROQUIP CORPORATION 58
Agency—Hoperaft-Keller, Inc.
AEROTEC CORPORATION, THE 66
Agency—Heming & Co., Inc.
AIRBORNE ACCESSORIES CORP. 8
Agency—Gray & Rogers Adv.
AIRCOOLED MOTORS, INC. 35
Agency—Richards & Webb, Inc.
AIRCRAFT RADIO CORP. 8
Agency—Burke Dowling Adams, Inc.
AMERICAN CYSTOSCOPE MAKERS INC. 52
Agency—Noyes & Sproul, Inc.
AMERICAN NON-GRAN BRONZE CO. 106
Agency—Norman P. Hewitt
ANTI-CORROSIVE METAL PRODUCTS 114
Agency—Woodard & Voss, Inc.
ASSOCIATED CO., INC. 114
Agency—The McCormick-Armstrong Co.
AVICA CORPORATION 95
Agency—Knight & Gilbert, Inc.
B. H. AIRCRAFT CO., INC. 97
Agency—Harold Marshall Adv. Co.
BARBER COLMAN CO. 93
Agency—Howard H. Monk & Assoc.
BENDIX PRODUCTS DIV., BENDIX AVIATION CORP. ..... Third Cover
Agency—MacManus, John & Adams, Inc.
BENDIX RADIO DIV., BENDIX AVIATION CORP. 37
Agency—MacManus, John & Adams, Inc.
BRILES MFG. CO. 54
Agency—McKee Burns Advertising
BURNDY ENGINEERING CO. 25
Agency—Ben Sackheim, Inc.
BURNS AERO SEAT CO., INC. 117
Agency—Buchanan & Co., Inc.
CHANCE VOUGHT DIV., UNITED AIRCRAFT CORP. 11
Agency—Lennett & Newell, Inc.
CONTINENTAL MOTORS CORP. 55
Agency—Cummings & Hopkins Adv.
CONTROL PRODUCTS, INC. 88
Agency—George Homer Martin Assoc.
CORNELIUS CO. 59
Agency—Dwyer & Dewes Adv.
deHAVILLAND AIRCRAFT OF CANADA 17
Agency—Paul Taylor Phelan, Ltd.
deHAVILLAND AIRCRAFT CO., LTD., THE 61
Agency—Samuels Clark & Co., Ltd.
DOW CHEMICAL CO. 78
Agency—MacManus, John & Adams, Inc.
DOW CORNING CORP. 86
Agency—Don Wagnitz Adv.
DUNBAR KAPPLE, INC. 61
Agency—Ideas Unlimited
EASTMAN KODAK CO. 49
Agency—J. Walter Thompson Co.
ELECTROL, INC. 71
Agency—G. B. Woodin Co.
ESSO STANDARD OIL CO. 109
Agency—McCann-Erickson, Inc.
FAIRCHILD ENGINE & AIRPLANE CORP. STRATOS DIV. 42
Agency—Buchanan & Co., Inc.
FLEX-O-TUBE DIV. OF MERIDAN CORP. 68
Agency—Charles M. Gray & Assoc.
FOOTE BROS. GEAR & MACHINE CORP. ..... Fourth Cover
Agency—The Buchen Company
GARRETT CORP., AIRESEARCH MFG. CO. 5
Agency—J. Walter Thompson Co.
GENERAL ELECTRIC CO. 75
Agency—G. M. Basford Co.
GOODYEAR TIRE & RUBBER CO. ..... Front Cover
Agency—Kudner Agency, Inc.
HANSEN MFG. CO. 85
Agency—Richard T. Brandt, Inc.
HAYDON CO., A. W. 77
Agency—Cory Snow, Inc.
HERBRAND DIV., THE BINGHAM-HERBRAND CORP. 74
Agency—Arthur R. Mogge, Inc.
HEVI DUTY ELECTRIC CO. 36
Agency—Camm, Costigan & Seitz, Inc.
KEARFOTT COMPANY, INC. 39
Agency—E. M. Freystadt Associates
KOHLER CO., THE 87
Agency—Roche, Williams & Cleary, Inc.
LAPOINTE MACHINE TOOL CO., THE 43
Agency—Wells Advertising Agency
LAVELLE AIRCRAFT CORP. 53
Agency—Geare-Marston, Inc.
LEAR, INC. 110
Agency—Buchanan & Co., Inc.
LEWIS ENGINEERING CO. 32
LOCKHEED AIRCRAFT CORP. 82, 83
Agency—Foote, Cone & Belding Adv.
LORD MFG. CO. 44
Agency—Davies & McKinney Adv.
MANNING, MAXWELL & MOORE, INC. 70
Agency—Fuller & Smith & Ross, Inc.
MAXSON CORP., THE W. L. 52
Agency—Engineered Advertising
McCULLOCH MOTORS CORP. 28
Agency—West-Marquis, Inc.
MINNEAPOLIS HONEYWELL REGULATOR CO. 53, 56, 57
Agency—Foote, Cone & Belding
MINNESOTA MINING & MFG. CO. 84
Agency—MacManus, John & Adams, Inc.
NEW DEPARTURE DIV., G.M.C. 3
Agency—D. P. Brother & Co., Inc.
NORTH AMERICAN AVIATION, INC. 92
Agency—Batten, Barton, Durstine & Osborn, Inc.
OMOHUNDRO CO., PAUL 67
Agency—Frances D. Gonda Co.
ONSRUD CUTTER MFG. CO. 74
Agency—Robert Peterson Adv. Agency
PACIFIC SCIENTIFIC CO. 55
Agency—Darwin H. Clark Co.
PASTUSHIN AVIATION CORP. 112
Agency—Lynn-Western, Inc.
PHEOLL MFG. CO. 65
Agency—The Cramer-Krasselt Co.
PORTABLE ELECTRIC TOOLS, INC. 79
Agency—Erwin, Wasey & Co., Ltd.
PSP ENGINEERING CO. 50
Agency—L. J. Swaim Advertising
RADIO CORP. OF AMERICA 81
Agency—J. Walter Thompson Co.
REMINGTON RAND, INC. 6
Agency—Leeford Adv. Agency, Inc.
REVERE CORP. OF AMERICA 62
Agency—Triolatal, Inc.
ROBINSON CO., RALPH C. 38
Agency—Chapin Dunin Advertising
SAGINAW STEERING GEAR DIV., G.M.C. 46
Agency—Price, Bedrick & Tanner, Inc.
SCHWEIZER AIRCRAFT CORP. 26
Agency—Lang Advertising, Inc.
SEARCHLIGHT SECTION 100, 101, 102, 103, 104, 105, 106
SERVOMECHANISMS, INC. 80
Agency—Sanger Funnell, Inc.
SHELL OIL CO. 13
Agency—J. Walter Thompson Co.
SINCLAIR REFINING CO. 60, 61
Agency—Morey, Humm & Johnstone, Inc.
SNAP-ON-TOOLS CORP. 91
Agency—The Cramer-Krasselt Co.
SPENCER THERMOSTAT DIV., METALS & CONTROLS CORP. 92
Agency—Sutherland-Abbott Ads.
SPERRY GYROSCOPE CO. 98, 99
Agency—Charles Dallas Reach Co., Inc.
STEPHEN-DOUGLAS CO., INC., THE 117
Agency—Broom Reichert, Inc.
THOMPSON PRODUCTS, INC. 69
Agency—Meldrum & Fewsmith, Inc.
TIMKEN ROLLER BEARING CO. 24
Agency—Batten, Barton, Durstine & Osborn, Inc.
TITEFLEX, INC. 41
Agency—John Falkner Arndt & Co.
TOMKINS-JOHNSON CO. 76
Agency—Broom Reichert, Inc.
TRANSPORT EQUIPMENT CO. 1
Agency—Javcraft Co.
TRANS-SONIC, INC. 85
Agency—Hare Advertising
U. S. ELECTRICAL MOTORS, INC. 23
Agency—The McCarty Company
UTICA DROP FORGE & TOOL CORP. 90
Agency—Wilson, Haight & Welch, Inc.
VOI SHAN MFG. CO., INC. 27
Agency—Anderson McConnell Adv. Agency
WEBER AIRCRAFT CORP. 76
Agency—Rutherauff & Ryan, Inc.
WELLMAN BRONZE & ALUMINUM CO. 96
Agency—R. C. Wellman & Assoc., Inc.
WESTINGHOUSE ELECTRIC CORP. 12
Agency—Fuller & Smith & Ross, Inc.
WHITTAKER CO., LTD., WM. R. 51
Agency—Meggs Privett, Inc.
WILCOX ELECTRIC CO. 45
Agency—Carter Ads. Agency, Inc.
X-RAY, INCORPORATED 29
Agency—Stockwell & Marcuse
ZENITH PLASTICS CO. ..... Second Cover
Agency—Frances D. Gonda Co.

SEARCHLIGHT SECTION

(Classified Advertising)
H. E. Hilts, Mgr.

EMPLOYMENT
Positions Vacant 100-103
Positions Wanted 100
Employment Agencies 100
NOTICES
Legal 106
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 104-106

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EDITORIAL

Putting a Squeeze on Industry

In its effort to hold down the national debt, the Eisenhower Administration is slowing down progress payments to aircraft and other war contractors. This shifting of financing to industry, unless accompanied by other modifications, may add to aircraft costs as well as interfere with production.

While some delays may occur in progress payments on current contracts, financial observers expect the real impact to be felt when new orders are awarded and full financial requirements must be anticipated by the prime contractors.

This attempt to transfer financing responsibility is commendable in itself, and is in keeping with a policy that aircraft builders should adopt in not seeking any privileged treatment, it is pointed out. However, the aircraft industry is in a poor position to finance any replacement funds for progress payments unless the Defense Dept. removes such restrictions as the one disallowing interest charges as a proper pricing element in contract costs.

"Once interest charges are reimbursable as a cost of doing business—the same as by all other industries who do not ordinarily deal with the government—a sound set of ground rules will prevail which will permit aircraft firms to compute cost estimates and submit their bids for production awards," one industry observer told AVIATION WEEK. "Unless corrective action of this type is effected, serious repercussions may take place in the aircraft industry."

Any prime builder, knowing it has to do its own financing without proper reimbursement, is likely to cut down on inventory. This will mean less forward ordering among suppliers and subcontractors, which, in turn, will reduce business volume all along the line and make for short scheduling and limited forward planning. Employment curves may be seriously affected in the process.

All this lack of stability will simply add to the cost structure of the industry and must ultimately be absorbed by the government in one form or another.

Strange Case of the Errant MiG

The back-tracking and double-talk on why we dare not keep that $100,000 prize of all aviation prizes—a whole, flyable Russian-built MiG-15, in perfect shape—which dropped out of the sky to our air base near Seoul the other day reminds us of the kind of diplomatic gobbledegook we were handed so much of when Mr. Acheson was Secretary of State and Assistant President.

As proper as all this diplomatic consideration of the Communists may be in striped-pants circles, it leaves a lot of Americans cold, us included. Because we don't need to be reminded that there is only one potential enemy of our kind of world. Who knows how many lives will be at stake if our aviation is found inferior in any important respects to Russia's, in event of war?

Yet, we have offered the MiG back to its "owners," the biggest Russian prize we ever had in our possession. Even if the possibly clever retort is true—that neither North Korea, China, nor Russia may dare to substantiate such ownership, we must hold the MiG ready for a quick return. This will make it impossible for us to put it through the exhaustive flight and static tests necessary for us to learn the most about it.

Feeling is running high in Far East Air Forces circles.

"Neither propaganda nor diplomatic shenanigans will compensate for the failure to obtain complete, verified performance data on the Communists' foremost airplane," AVIATION WEEK's Far East correspondent, Bill Jessup, cables from Tokyo.

"The Defense Secretary's order stunned authorities here in the Far East Command, as well as in the Far East Air Forces. Gen. Mark Clark, FEC commander, who made the original $100,000 offer for a MiG-15, was miffed, to say the least.

"For a long time," Jessup adds, "it has been no secret that USAF wanted a whole, flyable MiG. Air officers commented caustically when Denmark returned MiGs in which Polish airmen fled from behind the Iron Curtain, although they recognized that the Danes' action was in accord with accepted practices in foreign relations between two countries not at war.

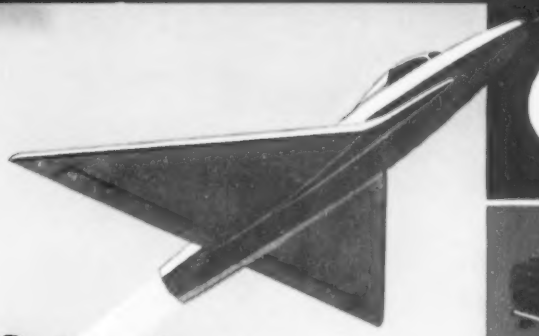
"But the North Korean MiG came over under different circumstances, for which there were no clearly established customs. Even if diplomacy eventually might dictate the advisability of returning the plane, it was a point of custom open for argument.

"Our pilots say they never could judge how consistently good or bad the MiG was. So much depends upon the pilot. Most Communist pilots (many under training) lacked the skill, the will or the freedom of action to exploit fully the airplane they were flying. The MiG is believed to be much better than its loss ratio in combat with the Sabre reveals. Wouldn't it be well to know what the MiG could do with the world's best pilots at the controls?"

Jessup reminds us that the Russians made no rush to return B-29s that landed on Russian soil during World War II—when the Soviet was our ally! Instead, they copied the Superfort and produced the TU-4, which now threatens our security. Does any American doubt that the Reds today would seize any new American plane, inspect it and fly it, and return it only if and when they were ready?

There should be ways to satisfy the high-policy international legal and diplomatic experts (whom Russia has ridiculed and scorned so often)—and still permit us to learn all we can about the MiG, because the Red fighter is exceedingly valuable to us, and Air Force Secretary Talbott's unfortunate comment at a press conference that it isn't worth much anyway since "it was a couple of years old" does not change this fact. We wonder if the Secretary is kidding only himself or the American people?

—Robert H. Wood



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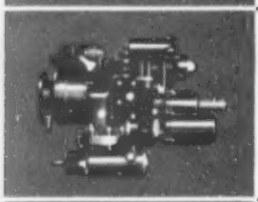
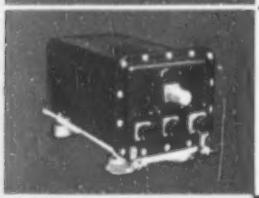
ELECTRONIC CONTROL Senses engine speeds, gas temperatures and other control factors — then signals fuel requirements to the fuel metering unit.



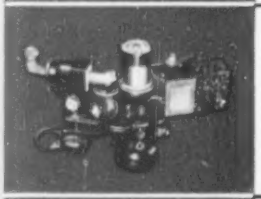
FUEL METERING UNIT Electrically controlled, this unit meters fuel to the engine in accord with signals from the electronic control.



ELECTRONIC AMPLIFIER Maintains a scheduled exhaust turbine temperature by controlling the nozzle area.

hydro-mechanical

MAIN FUEL CONTROL The control illustrated includes a governor which holds the engine at a selected speed regardless of altitude.



AFTERBURNER FUEL CONTROL Graduates the afterburner thrust by selecting fuel flow in various proportions to mass air flow through the engine.

NOZZLE CONTROL A hydro-mechanical servo control unit which actuates the variable exhaust nozzle mechanism of a jet engine.

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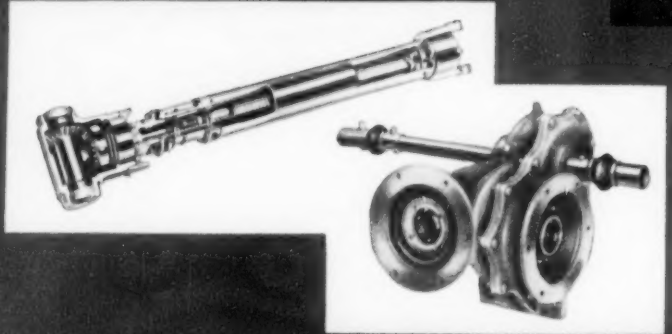

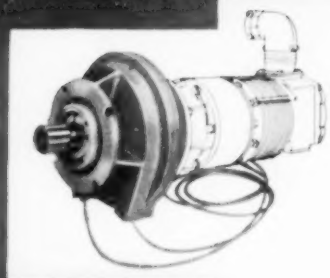

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